

From gwyn@paccomm.com Thu Aug 01 05:39:18 1996
Received: from paccomm.com (paccomm.com [163.125.30.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id FAA12823 for <hfsig@tapr.org>; Thu, 1 Aug 1996
05:39:13 -0500 (CDT)
Received: from gwyn.paccomm.com by paccomm.com with smtp
(Smail3.1.29.1 #1) id m0ulv9p-000FSAC; Thu, 1 Aug 96 06:39 EDT
Received: by gwyn.paccomm.com with Microsoft Mail
id <01BB7F74.1B3654E0@gwyn.paccomm.com>; Thu, 1 Aug 1996 06:38:53 -0400
Message-ID: <01BB7F74.1B3654E0@gwyn.paccomm.com>
From: Gwyn Reedy <gwyn@paccomm.com>
To: "'hfsig@tapr.org'" <hfsig@tapr.org>
Subject: Advantages of SS
Date: Thu, 1 Aug 1996 06:38:51 -0400
Encoding: 21 TEXT

Phil Karn said (in conclusion to an excellent technical tutorial)

>(SS has) the desirable effect of uniformly distributing the load over the
band. The law of large
>numbers kicks in and the carrying capacity of the band increases thanks to
the improved ability to >ynamically share spectrum.

>And this is ultimately why we should encourage spread spectrum on all of
our bands, especially >the most crowded ones.

I think this encapsulates the essence of SS resistance. Many amateur
spectrum users (might I call out contesters and DXers) do not want to share
spectrum; their satisfaction with the hobby derives from maximizing their
personal communication effectiveness both on transmit and receive. Sharing
is not one of their concerns. And this is the kind of person the ARRL
considers the mainstream of amateur radio.

Gwyn Reedy, W1BEL
PacComm Packet Radio Systems
<http://www.paccomm.com>

From karn@qualcomm.com Thu Aug 01 07:52:06 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org
(8.7.5/8.7.3/1.9) with ESMTP id HAA16383 for <hfsig@tapr.org>; Thu, 1 Aug 1996
07:52:04 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id
FAA18796; Thu, 1 Aug 1996 05:51:32 -0700 (PDT)
Date: Thu, 1 Aug 1996 05:51:32 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608011251.FAA18796@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <01BB7F74.1B3654E0@gwyn.paccomm.com> (message from Gwyn Reedy on Thu,
1 Aug 1996 05:42:56 -0500 (CDT))
Subject: Re: [HFSIG:1398] Advantages of SS

Gwyn's comments are perhaps a bit blunt, but he's certainly on the
right track.

Another issue I've been meaning to comment on is the relative efficiency of relay vs direct communications. The near-far problem comes up mainly in the context of a station desiring to communicate to a very distant point, typically requiring high power, while nearby SS stations are communicating among themselves at relatively low power.

I believe Robert Glassey made an earlier comment along these lines when he said that SS communications assume local cellular-style communications. And he was quite right, if by "cellular style" he meant heavy geographical reuse of spectrum, with relaying rather than high power used to reach more distant stations. "Cellular style" does NOT mean you're unable to talk DX, you just may not be able to do it directly. (I routinely "work" hundreds of miles with my little 300mw handheld 890 MHz unit...)

This strikes at another major aspect of ham radio: the "self-sufficient ethic". Despite the literal meaning of the third letter in "ARRL" the amateur culture strongly favors direct end-to-end communications, especially in the HF bands. Repeaters are generally not allowed on these bands, and even where they're allowed (e.g., on 10m) they are usually excluded from most contests as they're considered to be "cheating".

Now some of this undoubtedly comes from the fact that historically, repeaters consume more spectrum than simplex and are also limited resources that are better reserved for other things, like mobile users and emergencies. But there is also an underlying theme of self-sufficiency that says a ham should have to do it all by himself to gain credit. Big antennas and massive linear amplifiers command a lot of respect, while resorting to a repeater is at least an admission of inferiority, or even downright dishonest (if used in a competition).

Spread spectrum turns this culture on its head. Not only does the average ham have to accept the obviously absurd notion that a wideband signal can be more spectrally efficient than a narrowband signal, but he is also being asked to believe that repeaters can be more spectrally efficient than simplex! That is, a network of relatively low power store-and-forward spread spectrum packet radios with min-energy routing is far more spectrally efficient than direct high power end-to-end operation.

Even the reliability aspect of not wanting to depend on a repeater (sometimes cited in the context of emergency communications) is really not an issue here. All you need are enough stations to back each other up and you can have a network that, overall, is much *more* reliable than DX simplex thanks to the shorter inter-node propagation paths.

All this has actually always been true even for narrowband modulation; the near-far aspect of spread spectrum just makes it more glaringly obvious. With cooperative relaying, it would still be possible to work DX on HF. You just wouldn't necessarily do it

directly. Unfortunately, for a lot of hams this wouldn't be the same.

Phil

From k6sti@n2.net Thu Aug 01 09:32:12 1996
Received: from ravel.n2.net (rael.n2.net [204.250.22.20]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id JAA19335 for <hfsig@tapr.org>; Thu, 1 Aug 1996 09:32:08 -0500 (CDT)
Received: from ppp166.n2.net (ppp166.n2.net [204.250.22.166]) by ravel.n2.net (8.6.12/8.6.12) with SMTP id HAA07242 for <hfsig@tapr.org>; Thu, 1 Aug 1996 07:32:11 -0700
Date: Thu, 1 Aug 1996 07:32:11 -0700
Message-Id: <199608011432.HAA07242@rael.n2.net>
X-Sender: k6sti@mail.n2.net
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: k6sti@n2.net (Brian Beezley)
Subject: Shared SS

>But when the band gets loaded, and especially when the typical traffic
>consists of a lot of short, bursty transmissions, spread spectrum in
>general and frequency hopping in particular has the desirable effect
>of uniformly distributing the load over the band. The law of large
>numbers kicks in and the carrying capacity of the band increases
>thanks to the improved ability to dynamically share spectrum.

Narrowband users already dynamically share spectrum. They QSY to avoid QRM. But if their frequencies were overlayed with SS, they would experience QRM they couldn't evade.

Any attempt to mix SS and narrowband modes on HF will have to address the following complaint from day one:

Before this thing you call spread spectrum came along, I could always have a nice chat on 20-meter SSB. If QRM arose, we either convinced the other guy to move or we moved ourselves. But now, whenever I listen on the band I hear funny noises in the background. I can still hold a conversation but it's not pleasant listening to this stuff. I tried QSYing to find a clear spot but it didn't help--the damn stuff is everywhere. I missed a new country last week when that computer brat down the street fired up on SS and took out the whole band for hours. When the SS guys across town get on, I can hear well enough to check into the Old Farts net, but I often miss my turn when net control fades into their bleeps and bloops. Frankly, I don't get on 20 much any more because it's just not worth the trouble. I want my band back.

Any technical argument for SS that can't respond simply and directly to a complaint like this will be immediately dismissed as BS. Shared SS won't happen until hundreds of thousands of hams like the one imagined above are convinced that SS will bring benefit instead of destroying their present ham activities.

Brian Beezley, K6STI
k6sti@n2.net

From k5yfw@www.kelly-afb.org Thu Aug 01 10:50:42 1996
Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id KAA22057 for <hfsig@tapr.org>; Thu, 1 Aug 1996 10:50:40 -0500 (CDT)
Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id KAA23596 for hfsig@tapr.org; Thu, 1 Aug 1996 10:51:17 -0500 (CDT)
From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
Message-Id: <199608011551.KAA23596@www.kelly-afb.org>
Subject: Re: [HFSIG:1400] Shared SS
To: hfsig@tapr.org
Date: Thu, 1 Aug 1996 10:51:17 -0500 (CDT)
In-Reply-To: <199608011432.HAA07242@ravel.n2.net> from "Brian Beezley" at Aug 1, 96 09:37:09 am
Reply-To: k5yfw@www.kelly-afb.org
X-Mailer: ELM [version 2.4 PL24]
Content-Type: text

In your message you write:

>
> Narrowband users already dynamically share spectrum. They QSY to avoid QRM.
> But if their frequencies were overlaid with SS, they would experience QRM
> they couldn't evade.
>
> Any attempt to mix SS and narrowband modes on HF will have to address the
> following complaint from day one:

Way back there in my AFRes days, we were running SSB on several channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the spooks about 300 meters were running SS between 3 -15 MHz to the same locations that we were. Propagation to the location we were both talking to was fair on 8 MHz and poor on 11 Mhz with our equipment. The spooks had very good communications. We were running 500 Watts PEP and they were running less that a 100 watts IAW their specs. Also, it didn't matter if they were on-the-air or not, it had no affect on our communications and I don't recall seeing an increase in channel noise...it darn sure didn't bother the marine CW station on the channel ajacant to our main channel (frequency). Also, there was another spook station located about 5 miles away and we couldn't tell when either was transmitting unless we called them on the fieldfone and asked. I might also mention that they were running broadband antennas and we were running dipoles so our antennas were better.

>
> Before this thing you call spread spectrum came along, I could always have a
> nice chat on 20-meter SSB. If QRM arose, we either convinced the other guy
> to move or we moved ourselves. But now, whenever I listen on the band I
> hear funny noises in the background. I can still hold a conversation but
> it's not pleasant listening to this stuff. I tried QSYing to find a clear
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> band back.
>
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> complaint like this will be immediately dismissed as BS. Shared SS won't
> happen until hundreds of thousands of hams like the one imagined above are
> convinced that SS will bring benefit instead of destroying their present ham
> activities.
>
>

Based on my experience (see above) I have to disagree.

> Brian Beezley, K6STI
> k6sti@n2.net
>
>

Walt/K5YFW

```
=====
| The MicroSoft operating system didn't get as bad as it is overnight,|
| it has taken over 10 years of careful, calculated development.      |
=====
|                               |
|                               | The greatest dangers to liberty |
| Walt DuBose - K5YFW          | lurk in insidious encroachment |
| E-Mail k5yfw@www.kelly-afb.org | by men of zeal, well-meaning |
| Business Telephone: (210)925-6081 | but without understanding.   |
|   Home Telephone: (210)696-3196 |                               |
|                               | - Justice Louis D. Brandeis |
|                               |                               |
=====
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From Robert.Glassey@nmp.nokia.com Thu Aug 01 11:45:20 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id LAA23486 for <hfsig@tapr.org>; Thu, 1 Aug 1996
11:45:10 -0500 (CDT)
From: Robert.Glassey@nmp.nokia.com
Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by
noknic.nokia.com (8.6.9/8.6.9) with ESMTP id TAA29479 for <hfsig@tapr.org>; Thu, 1
Aug 1996 19:44:34 +0300

Received: from by samail01.nmp.nokia.com with SMTP
(1.37.109.16/16.2) id AA108957666; Thu, 1 Aug 1996 19:41:06 +0300
X-Openmail-Hops: 2
Date: Thu, 1 Aug 96 17:42:08 +0100
Message-Id: <H000029202272ac5@MHS>
In-Reply-To: <199608010120.SAA09782@servo.qualcomm.com>
Subject: Wide band modes
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

Hi Phil,

> Error correction is an especially powerful technique with frequency
> hopped spread spectrum, as opposed to direct sequence. Both the
[snip]
> But on a Rayleigh fading channel, both coherent and noncoherent
> schemes exhibit a error rate that decreases only *linearly* with
> increasing SNR. That is, if you want to decrease your bit error rate
> by a factor of 10, you need to increase your power by a factor of
> ten. The different schemes do differ in the precise amount of power
> required (e.g., ideal coherent BPSK is 3 dB better than DBPSK, which
> is 3 dB better than BFSK) but they are all exactly parallel over a
> very wide range of SNR.
>
> Some illustrative figures: for a BER of 1%, uncoded BPSK on a Rayleigh
> channel requires an E_b/N_0 of about 20 dB. To lower the BER to .1%, you
> need 30 dB. To achieve 10^{-6} , you need an coax-melting E_b/N_0 of 60dB!

> If you're after a low error rate on a fading channel, the proper use
> of coding and interleaving can have a dramatic effect. While coding
> can get you perhaps 7 dB at best on an AWGN channel, on a Rayleigh
> fading channel it's not hard to achieve as much as 35 - 40 dB in power
> savings compared to uncoded transmission. That's pretty impressive.

It is indeed. I have no arguments here. I've long suspected as much, although I've never had the numbers that show it. Although even very simple ECC can make back most of this 35-40db difference. ie and AMTOR ARQ works well with a BER of 10^{-2} (1%), as does RTTY where the operator fills in the errors. I think BPSK requires about 4 or 5dB for 1% BER in a AWGN channel, so were talking about 15dB extra power over the non-fading case. I guess most of this need for power is to give enough fade margin so that the signal only drops below the threshold 1% of the time.

I guess without any extra power, the signal would be above the threshold 50% of the time. Thus we have a 50% BER. A 1/2 rate ECC would ideally deal with this, although I guess a bit more redundancy would be usefull.

In the light of this 15dB fade margin, I wonder how much effect soft decoding would really have. Would erasure decoding be just as good? What I'm geting at is PACTOR II's K=9 or is it 11 constraint length. Would k=5 be just as good? Or could we just go for plain Reed Soloman coding? This would make PC implementation of an HFSIG protocol more

realistic.

But getting back to your spreading argument, I've just suggested tripling the bandwidth to overcome fading, or have I?

I recall Ungerboch (I can never spell that) said that the solution was to go for multi levels, even if you cannot actually resolve each one discretely. Enough extra bits get through to give you the ECC bits for free (power and bandwidth-wise). This works in the AWGN channel, but in the fading channel it could be a real bonus, since some of the time the signal is several times what is required, allowing many additional levels. I imagine special attention would have to be paid to equalisation to overcome ISI when phase levels of 16+ PSK are used. (I've done on air measurements of PACTOR II transmissions using 8-psk, and the phase coherence is remarkably good over the DL-G path on 14MHz). Even amplitude levels could be considered since for a significant proportion of the time (>90%) they could be resolved. 64-QAM may not be unrealistic!! - giving an actual QPSK data rate, while overcoming the fading, and allowing high data rates when conditions are good. PACTOR II and clover seem to do the reverse, reducing ECC as level increase. Ungerboch says this is the wrong way around.

> Now these gains are admittedly somewhat separate from the issue of
> spread spectrum frequency hopping. But some bandwidth expansion just
> from the coding is inevitable, and this expansion is likely to be
> greater than on the AWGN channel.

Not inevitable, but I can still see that a wider band signal will have faster fades that are more easily dealt with. I think the wider bandwidth helps when you consider interference from other users. Still a narrow bandwidth allows more users in the same wide bandwidth without interference. 6 of one, half dozen of another as they say. I don't think either can make full use of the bandwidth.

> But on the Rayleigh fading channel, both the achievable coding gains
> and the bandwidth expansion ratios are considerably greater. Not only
> are orthogonal signalling constellations with a fairly large number of
> dimensions necessary (e.g., M-ary FSK with large M), but the optimum
> FEC code rates for use with these schemes are lower than on the AWGN
> channel. For example, 16-ary FSK requires 4 times as much bandwidth as
> BFSK for the same data rate, and rate 1/8 coding is optimal for this
> value of M. That's a 32x bandwidth expansion, but it performs about 5
> dB better than a rate 1/2 code combined with BFSK (which only doubles
> the uncoded bandwidth).

Hmm, this is interesting, especially the 5dB increase over the BPSK case. I wonder what it would be over the 64-QAM case.

So we are now talking about say 500Hz x 32 or about 16kHz bandwidth. Interesting. Of course this is not hopping yet.

> And it may not always be necessary to spread at all; on a lightly
> loaded band, you could simply turn off hopping once you've found what

> appears to be an empty channel. (This is equivalent to dropping every
> channel but one from the hopping list).

How resistant would this M-ARY scheme be to other signals? I wonder if different convolution codes could be used to provide further resistance between signals (getting very spread spectrum like now), with some sequential soft decoding being used to distinguish between the different stations, rather than just using a majority vote detector. Could this provide enough resistance to other stations on the same channel? It may be possible to decode 100% a weaker station while a much stronger station, or two use the same channel. MARY FSK seems to have quite an advantage here.

Hopping in addition to this would allow for more stations again.

I'm actually fairly well convinced that with a properly designed digital radio, with a wide bandwidth and demod controlled AGC could overcome the near far problem quite well, especially if spread enough so that local impulses cause a BER of < 10%. I even like the idea!

The concern is about sharing the band with other users. I don't think there is much concern about sharing the band with other wideband users, and I can see that it may well be a more efficient way of using the allocated spectrum, but sharing in an amateur environment is not just about getting the maximum number of users into a particular band. Amateur radio must allow many different modes, each with different strengths and weakness to co-exist without causing each other interference. The amateur service is an 'experimental' service, which allows people to 'play' with radio techniques and in many different forms to learn more about radio, and have fun doing it.

If this mode can be made to work in a unspread (25kHz) bandwidth (same 25kHz allocation world wide) then I would support it, as a start, and if it proves so popular that spreading becomes necessary to accommodate the number of stations, then there may be a good argument for allocating say 100kHz to the mode allowing hopping, without seriously affecting other hams and their legitimate interests. If demand further increases then we may have a good case for a NEW BAND, especially as HF spectrum is being slowly cleared of commercial users.

I would support all these cases, but I could never support turning over whole existing bands to spread spectrum. It's not in the spirit of ham radio.

I posted a list of various assumptions that are made when arguing the case for spread spectrum. Most of them still stand, although I think we have improved the near-far problems.

1 & 4. Hams do want to work DX, simplex. It's not selfish, it's the spirit of ham radio, it's what excites many people about the hobby. Maybe when the bands are so badly congested that DX is impossible SS may be our only hope, but that would reduce ham radio to a single mode, with little advantage (if any) over commercial cellular data networks and the

internet. I think that day would be an especially black one for the future of the hobby, and many would feel ham radio is not worthwhile anymore.

2 & 3. The near far thing. Still a problem for non-fec data users, and SSB operators without DSP based noise blankers. They still have the right to experiment with less than perfect modes, everyone must start somewhere, and simple modes are a good starting point.

5. Ham radio is an experimental service for self education. Reducing ham radio to a single mode, with only the prospect of contact with your local ISP, or someone only a few 100 miles away being considered DX, would pretty much spell the end of amateur radio. If we can only use it as the poor mans data network, then the rich men will get it.

Maybe this is the future of ham radio, but I'd like to think otherwise.

Rob.

From LANIER.R.A-@smtpgty.bwi.wec.com Thu Aug 01 12:44:03 1996
Received: from tron.bwi.wec.com (tron.bwi.wec.com [129.228.4.1]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id MAA25642 for <hfsig@tapr.org>; Thu, 1 Aug 1996 12:43:45 -0500 (CDT)
Received: from [129.228.117.132] by tron.bwi.wec.com; (5.65/1.1.8.2/31May95-0229PM)
id AA15528; Thu, 1 Aug 1996 13:40:22 -0400
Received: from ccMail by smtpgty.bwi.wec.com (IMA Internet Exchange 2.0 Enterprise) id 200EC2C0; Thu, 1 Aug 96 13:41:00 -0400
Mime-Version: 1.0
Date: Thu, 1 Aug 1996 13:38:36 -0400
Message-Id: <200EC2C0.1858@smtpgty.bwi.wec.com>
From: LANIER.R.A-@smtpgty.bwi.wec.com (LANIER.R.A-)
Subject: Re: [HFSIG:1400] Shared SS
To: hfsig@tapr.org
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Description: cc:Mail note part

I'd like to know a little more about this 'computer brat down the street.' How do you know he is using SS? What is his output power if he is using SS? When the SS guys across town get on the band, how much power are they using? Are you sure they are "SS guys?"

What do these 'funny noises' sound like? I'm not trying to be condescending, Brian, but I think you are mistaking packet radio for SS.

73s de
Tony, KE4AT0

----- Reply Separator -----
Subject: [HFSIG:1400] Shared SS

Author: hfsig@tapr.org at BALT.SMTP

Date: 8/1/96 9:37 AM

>But when the band gets loaded, and especially when the typical traffic
>consists of a lot of short, bursty transmissions, spread spectrum in
>general and frequency hopping in particular has the desirable effect
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Brian Beezley, K6STI
k6sti@n2.net

From LANIER.R.A-@smtpgty.bwi.wec.com Thu Aug 01 12:46:30 1996

Received: from tron.bwi.wec.com (tron.bwi.wec.com [129.228.4.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id MAA25672 for <hfsig@tapr.org>; Thu, 1 Aug 1996
12:45:46 -0500 (CDT)

Received: from smtpgty.bwi.wec.com by tron.bwi.wec.com;
(5.65/1.1.8.2/31May95-0229PM)

id AA12321; Thu, 1 Aug 1996 13:42:06 -0400

Received: from ccMail by smtpgty.bwi.wec.com

(IMA Internet Exchange 2.0 Enterprise) id 200ED5B0; Thu, 1 Aug 96 13:46:03 -0400

Mime-Version: 1.0
Date: Thu, 1 Aug 1996 13:44:54 -0400
Message-Id: <200ED5B0.1858@smtpgty.bwi.wec.com>
From: LANIER.R.A-@smtpgty.bwi.wec.com (LANIER.R.A-)
Subject: Re: [HFSIG:1399] Re: Advantages of SS
To: hfsig@tapr.org
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Description: cc:Mail note part

Phil,

Could you PLEASE run for president of the ARRL?

73s de
Tony, KE4ATO

----- Reply Separator -----
Subject: [HFSIG:1399] Re: Advantages of SS
Author: hfsig@tapr.org at BALT.SMTP
Date: 8/1/96 8:05 AM

Gwyn's comments are perhaps a bit blunt, but he's certainly on the right track.

Another issue I've been meaning to comment on is the relative efficiency of relay vs direct communications. The near-far problem comes up mainly in the context of a station desiring to communicate to a very distant point, typically requiring high power, while nearby SS stations are communicating among themselves at relatively low power.

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This strikes at another major aspect of ham radio: the "self-sufficient ethic". Despite the literal meaning of the third letter in "ARRL" the amateur culture strongly favors direct end-to-end communications, especially in the HF bands. Repeaters are generally not allowed on these bands, and even where they're allowed (e.g., on 10m) they are usually excluded from most contests as they're considered to be "cheating".

Now some of this undoubtedly comes from the fact that historically, repeaters consume more spectrum than simplex and are also limited resources that are better reserved for other things, like mobile users

and emergencies. But there is also an underlying theme of self-sufficiency that says a ham should have to do it all by himself to gain credit. Big antennas and massive linear amplifiers command a lot of respect, while resorting to a repeater is at least an admission of inferiority, or even downright dishonest (if used in a competition).

Spread spectrum turns this culture on its head. Not only does the average ham have to accept the obviously absurd notion that a wideband signal can be more spectrally efficient than a narrowband signal, but he is also being asked to believe that repeaters can be more spectrally efficient than simplex! That is, a network of relatively low power store-and-forward spread spectrum packet radios with min-energy routing is far more spectrally efficient than direct high power end-to-end operation.

Even the reliability aspect of not wanting to depend on a repeater (sometimes cited in the context of emergency communications) is really not an issue here. All you need are enough stations to back each other up and you can have a network that, overall, is much **more** reliable than DX simplex thanks to the shorter inter-node propagation paths.

All this has actually always been true even for narrowband modulation; the near-far aspect of spread spectrum just makes it more glaringly obvious. With cooperative relaying, it would still be possible to work DX on HF. You just wouldn't necessarily do it directly. Unfortunately, for a lot of hams this wouldn't be the same.

Phil

From k5yfw@www.kelly-afb.org Thu Aug 01 13:58:40 1996
Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id NAA28419 for <hfsig@tapr.org>; Thu, 1 Aug 1996 13:58:38 -0500 (CDT)
Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id NAA24314 for hfsig@tapr.org; Thu, 1 Aug 1996 13:59:17 -0500 (CDT)
From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
Message-Id: <199608011859.NAA24314@www.kelly-afb.org>
Subject: Re: [HFSIG:1404] Re: Advantages of SS
To: hfsig@tapr.org
Date: Thu, 1 Aug 1996 13:59:16 -0500 (CDT)
In-Reply-To: <200ED5B0.1858@smtpgty.bwi.wec.com> from "LANIER.R.A-" at Aug 1, 96 12:50:49 pm
Reply-To: k5yfw@www.kelly-afb.org
X-Mailer: ELM [version 2.4 PL24]
Content-Type: text

Hear...hear...

>
> Phil,
>
> Could you PLEASE run for president of the ARRL?
>
> 73s de
> Tony, KE4ATO
>
>
> ----- Reply Separator -----
> Subject: [HFSIG:1399] Re: Advantages of SS
> Author: hfsig@tapr.org at BALT.SMTP
> Date: 8/1/96 8:05 AM
>
>
> Gwyn's comments are perhaps a bit blunt, but he's certainly on the
> right track.

From forrerj@peak.org Thu Aug 01 14:03:00 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id OAA28494 for <hfsig@tapr.org>; Thu, 1 Aug 1996
14:02:52 -0500 (CDT)
Received: from p00.t0.monrotel.com (p00.t0.monrotel.com [198.68.25.33]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id MAA06926 for <hfsig@tapr.org>; Thu, 1 Aug
1996 12:02:55 -0700
Message-Id: <199608011902.MAA06926@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Thu, 01 Aug 1996 11:50:54 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer)
Subject: Re: [HFSIG:1399] Re: Advantages of SS

Hi Folks,

I must say that I really enjoy the stimulating discussion about HF SS -
extremely educational.

Personally, I'm not hearing convincing arguments either way, especially
based on extreme situations or extrapolations.

Could someone please comment on the following:

1) If assumed that the center frequency of different DS SS operations are
randomly chosen, what would that do to the near-far problem, i.e., if you
use DS SS and experiencing interference from your neighbor DS SS operator,
why not QSY out of harm's way of the offending signal envelope? This assumes
that contacts are initially established on some known frequency. Am I right
in assuming that if only two parties are involved in DS SS, that the PSD
does have a maxima somewhere, even though it is a wideband, i.e, not quite
white over the full bandwidth?

2) How many SS participants does it take to start raising the noise floor to a point where it becomes objectionable? 2, 10, 100, 1000 ? If the number is 1000, would it be realistic, given a comparable narrow-band situation, to expect anyone to be able to conduct a QSO with that occupancy? Like a contest with 1000 RTTY operators calling simultaneously in the 14.090 - 14.065 20 meter segment.

As a lay person, and I admit I'm ignorant, the latter is the impression that I get from folks attempting to defend the narrow-band ideology. I'nt it time for someone to demonstrate a two-way digital QSO using SS on HF so we can all see for ourselves the magnitude of the real issues?

My two cents worth.

--Johan

From chbrain@dircon.co.uk Thu Aug 01 14:54:58 1996
Received: from felix.dircon.co.uk (felix.dircon.co.uk [193.128.224.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id 0AA00703 for <hfsig@tapr.org>; Thu, 1 Aug 1996 14:54:53 -0500 (CDT)
Received: by felix.dircon.co.uk id AA05448
(5.67b/IDA-1.5 for <hfsig@tapr.org>); Thu, 1 Aug 1996 20:54:51 +0100
Received: from gw2-168.pool.dircon.co.uk(194.112.35.168) by amnesiac via smap (V1.3)
id sma005434; Thu Aug 1 20:54:42 1996
Message-Id: <1.5.4.32.19960801194143.0067b328@popmail.dircon.co.uk>
X-Sender: chbrain@popmail.dircon.co.uk
X-Mailer: Windows Eudora Light Version 1.5.4 (32)
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Thu, 01 Aug 1996 20:41:43 +0100
To: hfsig@tapr.org
From: Charles Brain <chbrain@dircon.co.uk>
Subject: Re: [HFSIG:1403] Re: Shared SS

At 12:50 01/08/96 -0500, you wrote:

> I'd like to know a little more about this 'computer brat down the
> street.' How do you know he is using SS?

He isn't actually. In fact he is a member of Joe Public who has just turned his P.C on (The grey box with all the wires hanging out the back).

:- }

- Charles

From alanb@polecat.sr.hp.com Thu Aug 01 15:31:45 1996
Received: from relay.hp.com (relay.hp.com [15.255.152.2]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id PAA01939 for <hfsig@tapr.org>; Thu, 1 Aug 1996 15:31:42 -0500 (CDT)

Received: from srmail.sr.hp.com by relay.hp.com with ESMTP
(1.37.109.16/15.5+ECS 3.3) id AA055901500; Thu, 1 Aug 1996 13:31:41 -0700
Received: from polecat.sr.hp.com (algae.sr.hp.com) by srmail.sr.hp.com with ESMTP
(1.37.109.16/15.5+ECS 3.3) id AA242881500; Thu, 1 Aug 1996 13:31:40 -0700
Received: by polecat.sr.hp.com
(1.37.109.16/15.5+ECS 3.3) id AA171931499; Thu, 1 Aug 1996 13:31:39 -0700
From: Alan Bloom <alanb@polecat.sr.hp.com>
Message-Id: <199608012031.AA171931499@polecat.sr.hp.com>
Subject: SS on HF bands
To: hfsig@tapr.org
Date: Thu, 1 Aug 1996 13:31:39 -0800 (PDT)
X-Mailer: ELM [version 2.4 PL21]
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

Phil Karn <karn@qualcomm.com> said:

>So my main concern with the existing rules is that they keep us from
>using modulation and coding methods that conserve RF power. The result
>is a larger average amount of interference power to both narrowband
 ^^^^^^
>and wideband users. ...

>Yes, it is possible to concoct worst cases where spread spectrum (or
>even a power-efficient wideband modulation scheme) could occasionally
>interfere with a nearby narrowband user. ...

>And this is ultimately why we should encourage spread spectrum on all
>of our bands, especially the most crowded ones.

Sigh. Let me try explaining this once again.

Spread spectrum works fine for something like a cellular telephone system
where the locations and power levels of all stations are well-controlled.
But on the amateur bands, stations are randomly distributed.

There is no need to "concoct worst case" scenarios: Most amateur
communication requires contacting a station that is much farther away
than other nearby stations.

If that nearby interfering station is using wide-band modulation, then the
interference potential is much greater, even though the *average* power
may be less. A decent communications receiver can handle narrowband
interference around 100 dB stronger than the noise level. Spreading the
interfering signal by, say, a factor of 100 only reduces the interference
by 20 dB. Narrowband has something like an 80 dB advantage over
broadband in this regard.

>I believe Robert Glassey made an earlier comment along these lines
>when he said that SS communications assume local cellular-style
>communications. And he was quite right, if by "cellular style" he
>meant heavy geographical reuse of spectrum, with relaying rather than

>high power used to reach more distant stations. "Cellular style" does
>NOT mean you're unable to talk DX, you just may not be able to do it
>directly. (I routinely "work" hundreds of miles with my little 300mw
>handheld 890 MHz unit...)

Cellular-style communications doesn't work on DX bands, because
nearby stations are typically very much weaker than distant stations.
(Because ground wave propagation is much lossier than sky wave.)

Even on the VHF/UHF bands, I have a hard time seeing how it would work.
If you are 100 yards from the nearest station, and 10 miles from the
next nearest (a not untypical situation), then you and your neighbor
will be able to relay between yourselves with no problem, but will have
trouble relaying to the next station in the chain over the +85 dB
interference from down the street. With narrow-band modulation, that
wouldn't be a problem.

>This strikes at another major aspect of ham radio: the
>"self-sufficient ethic". ...

(Much ad-hominum argument against narrow-band modulation omitted.)

>Spread spectrum turns this culture on its head. Not only does the
>average ham have to accept the obviously absurd notion that a wideband
>signal can be more spectrally efficient than a narrowband signal, ...

"Can be" but not "is" in this case. I guess I'm one of those ignorant
average hams...

AL N1AL

From alanb@polecat.sr.hp.com Thu Aug 01 17:06:30 1996
Received: from hp.com (hp.com [15.255.152.4]) by tapr.org (8.7.5/8.7.3/1.9) with
ESMTP id RAA05884 for <hfsig@tapr.org>; Thu, 1 Aug 1996 17:06:15 -0500 (CDT)
Received: from srmail.sr.hp.com by hp.com with ESMTP
(1.37.109.16/15.5+ECS 3.3) id AA150507166; Thu, 1 Aug 1996 15:06:07 -0700
Received: from polecat.sr.hp.com (algae.sr.hp.com) by srmail.sr.hp.com with ESMTP
(1.37.109.16/15.5+ECS 3.3) id AA260237165; Thu, 1 Aug 1996 15:06:06 -0700
Received: by polecat.sr.hp.com
(1.37.109.16/15.5+ECS 3.3) id AA232007164; Thu, 1 Aug 1996 15:06:04 -0700
From: Alan Bloom <alanb@polecat.sr.hp.com>
Message-Id: <199608012206.AA232007164@polecat.sr.hp.com>
Subject: SS on HF
To: hfsig@tapr.org
Date: Thu, 1 Aug 1996 15:06:04 -0800 (PDT)
X-Mailer: ELM [version 2.4 PL21]
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

forrerj@peak.org (Johan Forrer) said:

>2) How many SS participants does it take to start raising the noise floor to

>a point where it becomes objectionable? 2, 10, 100, 1000 ? ...

It only takes 1 if he is more than 20 dB or so louder than the signal you are trying to receive. On HF, it is very rare to be working one of the loudest signals on the band. Even for normal rag chewing, there are typically a number of stations on the band that are much stronger than the station you are talking to. When working a weak DX station, *most* of the signals on the band are more than 20 dB louder. If even one of those is running spread spectrum, you're out of luck.

If the SS station is running low power due to some dynamic power control scheme, then that improves things somewhat. But even if that 20 dB number becomes 30 or 40 dB, one SS station will still wipe out the band for a large number of narrowband users. And by the way, other SS users will have the same problem.

AL N1AL

From forrerj@peak.org Thu Aug 01 19:11:17 1996
Received: from PEAK.ORG (PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id TAA09850 for <hfsig@tapr.org>; Thu, 1 Aug 1996 19:11:10 -0500 (CDT)
Received: from p00.t0.monrotel.com (p02.t0.monrotel.com [198.68.25.35]) by PEAK.ORG (8.6.13/8.6.7) with SMTP id RAA06070 for <hfsig@tapr.org>; Thu, 1 Aug 1996 17:10:58 -0700
Message-Id: <199608020010.RAA06070@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Thu, 01 Aug 1996 16:59:06 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1409] SS on HF

Hi Al,

>forrerj@peak.org (Johan Forrer) said:

>

>>2) How many SS participants does it take to start raising the noise floor to
>>a point where it becomes objectionable? 2, 10, 100, 1000 ? ...

>

>It only takes 1 if he is more than 20 dB or so louder than the signal you
>are trying to receive.

>On HF, it is very rare to be working one of the

>loudest signals on the band. Even for normal rag chewing, there are

>typically a number of stations on the band that are much stronger than the

>station you are talking to. When working a weak DX station, *most* of

>the signals on the band are more than 20 dB louder. If even one of those

>is running spread spectrum, you're out of luck.

To help me understand it a bit better: how much power (EIRP) would that single SS station need to run to be 20 dB over your DX station?

Assume for argument sake that its a station in another state thats running DS SS spread over 1 MHz bandwidth thats not skip to you; he's beaming in your direction and that you receive the DX at S1 level?

--Johan

From rick@itron-ca.com Thu Aug 01 20:22:31 1996
Received: from itron-ca.com (gate.itron-ca.com [204.30.20.2]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id UAA12253 for <hfsig@tapr.org>; Thu, 1 Aug 1996 20:22:29 -0500 (CDT)
Received: (from audit@localhost) by itron-ca.com (8.6.9/8.6.9) id SAA04486 for <hfsig@tapr.org>; Thu, 1 Aug 1996 18:21:52 -0700
Received: from unknown(204.30.20.214) by gate.itron-ca.com via smap (V1.3mjr) id sma004484; Thu Aug 1 18:21:30 1996
Date: Thu, 1 Aug 96 18:17:47
From: Rick Booth <rick@itron-ca.com>
Subject: SS Stuff
To: hfsig@tapr.org
X-PRIORITY: 3 (Normal)
X-Mailer: Chameleon 5.0, TCP/IP for Windows, NetManage Inc.
Message-ID: <Chameleon.838949133.rick@rickb.itron-ca.com>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

With regard to interference between SS systems and "conventional" users:

Consider a frequency hopper with the following properties. Using 2.4 KHz as the bandwidth of the radio and assuming a baud rate of 300 (the most allowed by the FCC) and assuming 4 bits per baud then in order to burst a bit sync preamble plus 10 bytes of data then the signal will have to dwell on the frequency for about 84 milliseconds (80 bits plus 20 sync bits). For 40 meters the band is only 300 KHz wide so the band is divided into about 125 slots to hop into. This means every 10 seconds on the average the SS system will jump into a typical 2.4 KHz single sideband "slot" and camp there for 84 milliseconds not counting filter thump from the 400 microsecond transient of a 2.4 KHz filter.

This might be annoying if the SS guy is down the street.

Rick
W6NZK

Rick Booth
'95 900SS SP

E-mail: rick@itron-ca.com

From karn@qualcomm.com Fri Aug 02 01:42:44 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id BAA27250 for <hfsig@tapr.org>; Fri, 2 Aug 1996 01:42:42 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id XAA28458; Thu, 1 Aug 1996 23:42:11 -0700 (PDT)
Date: Thu, 1 Aug 1996 23:42:11 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608020642.XAA28458@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <Chameleon.838949133.rick@rickb.itron-ca.com> (message from Rick Booth on Thu, 1 Aug 1996 20:26:50 -0500 (CDT))
Subject: Re: [HFSIG:1411] SS Stuff

Rick seems to be describing a slow hopper, i.e., a system with multiple data bits per hop. This produces a fairly long dwell time on each channel. I was envisioning a "medium speed" hopper, with something like one symbol per hop. That makes for a much faster hop rate and a shorter dwell time on each channel.

As an aside, fast hopping is defined as multiple hops per modulation symbol, and that implies a noncoherent combining loss because it's difficult or impossible to maintain phase coherence across a hop. (Even if the radios could do it, chances are you're hopping by more than the coherence bandwidth of the channel.) Because of this loss, fast hopping is generally recommended only against active intelligent jamming, or when the coherence bandwidth of the channel is unusually narrow, i.e., when the delay spread is long enough to otherwise cause considerable ISI at the desired modulation symbol rate.

Phil

From karn@qualcomm.com Fri Aug 02 01:59:44 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id BAA27708 for <hfsig@tapr.org>; Fri, 2 Aug 1996 01:59:42 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id XAA28468; Thu, 1 Aug 1996 23:59:10 -0700 (PDT)
Date: Thu, 1 Aug 1996 23:59:10 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608020659.XAA28468@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <199608012206.AA232007164@polecat.sr.hp.com> (message from Alan Bloom on Thu, 1 Aug 1996 17:08:33 -0500 (CDT))
Subject: Re: [HFSIG:1409] SS on HF

>It only takes 1 if he is more than 20 dB or so louder than the signal you
>are trying to receive. On HF, it is very rare to be working one of the

>becomes 30 or 40 dB, one SS station will still wipe out the band for a
>large number of narrowband users. And by the way, other SS users will
>have the same problem.

Again, this analysis seems to assume direct sequence. Frequency hopping is quite different thanks to the bursty nature of the interference.

Phil

From frode@dxcern.cern.ch Fri Aug 02 03:29:59 1996
Received: from dxmint.cern.ch (dxmint.cern.ch [137.138.26.76]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id DAA00340 for <hfsig@tapr.org>; Fri, 2 Aug 1996 03:29:57 -0500 (CDT)
Received: from dxcern.cern.ch (frode@dxcern.cern.ch [137.138.28.189]) by dxmint.cern.ch with SMTP id KAA07243 for <hfsig@tapr.org>; Fri, 2 Aug 1996 10:09:09 +0200 (MET DST)
Received: by dxcern.cern.ch (5.65/DEC-Ultrix/4.3) id AA17066; Fri, 2 Aug 1996 10:09:09 +0200
Date: Fri, 2 Aug 1996 10:09:07 +0200 (MET DST)
From: Frode Weierud <frode@dxcern.cern.ch>
To: hfsig@tapr.org
Cc: hfsig@tapr.org
Subject: Re: [HFSIG:1401] Re: Shared SS
In-Reply-To: <199608011551.KAA23596@www.kelly-afb.org>
Message-Id: <Pine.ULT.3.91.960802091805.15741A-100000@dxcern.cern.ch>
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

On Thu, 1 Aug 1996, Walt DuBose - K5YFW wrote:

> Way back there in my AFRes days, we were running SSB on several
> channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the spooks
> about 300 meters were running SS between 3 -15 MHz to the same
> locations that we were. Propagation to the location we were both
> talking to was fair on 8 MHz and poor on 11 Mhz with our equipment.
> The spooks had very good communications. We were running 500 Watts
> PEP and they were running less that a 100 watts IAW their specs.
> Also, it didn't matter if they were on-the-air or not, it had no
> affect on our communications and I don't recall seeing an
> increase in channel noise...it darn sure didn't bother the marine
> CW station on the channel ajacant to our main channel (frequency).
> Also, there was another spook station located about 5 miles away
> and we couldn't tell when either was transmitting unless we called
> them on the fieldfone and asked. I might also mention that they
> were running broadband antennas and we were running dipoles so our
> antennas were better.
>

As far as I know we already have SS transmissions on most if not all of our HF bands. Some years back I visited a military installation using SS on HF and I asked them if they blanked out the amateur bands and marine

bands etc. The answer was NO. Their reply was that as we could not hear them they would not interfere and hence there was no reason not to include the ham bands in their frequency pools. I don't know what power they normally used, but they were equipped with 1KW and 10KW power amplifiers and the antennas were LPAs and disk-cones.

This is a one off experience, but I have the feeling that their attitude concerning SS and interference might be wide-spread and that many military/government organisations using SS will think the same way. Their main reason for using SS is the low probability of intercept and anti-jamming properties.

It would be interesting to hear if anybody else have some experience from military/government use of SS on HF, and specially if anybody is situated close to such an installation they could perhaps let us know if they have ever been able to detect the presence of SS signals.

73's Frode, F/LA2RL

Frode Weierud Phone : +41 22 7674794
CERN, SL, CH-1211 Geneva 23, Fax : +41 22 7679185
Switzerland E-mail : Frode.Weierud@cern.ch

From Robert.Glassey@nmp.nokia.com Fri Aug 02 06:54:53 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id GAA05742 for <hfsig@tapr.org>; Fri, 2 Aug 1996 06:54:48 -0500 (CDT)
From: Robert.Glassey@nmp.nokia.com
Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id OAA10169 for <hfsig@tapr.org>; Fri, 2 Aug 1996 14:54:11 +0300
Received: from by samail01.nmp.nokia.com with SMTP (1.37.109.16/16.2) id AA108716642; Fri, 2 Aug 1996 14:50:42 +0300
X-Openmail-Hops: 2
Date: Fri, 2 Aug 96 12:51:50 +0100
Message-Id: <H0000292022934c2@MHS>
In-Reply-To: <200ED5B0.1858@smtpgty.bwi.wec.com>
Subject: SS and the Amateur culture
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

> I believe Robert Glassey made an earlier comment along these lines
> when he said that SS communications assume local cellular-style
> communications. And he was quite right, if by "cellular style" he
> meant heavy geographical reuse of spectrum, with relaying rather than

[snip] ... Yip, thats what I meant.

> This strikes at another major aspect of ham radio: the
> "self-sufficient ethic". Despite the literal meaning of the third
[snip]

> gain credit. Big antennas and massive linear amplifiers command a lot

> of respect, while resorting to a repeater is at least an admission of
> inferiority, or even downright dishonest (if used in a competition).

[snip]

> Spread spectrum turns this culture on its head. Not only does the
[snip]

> he is also being asked to believe that repeaters can be more
> spectrally efficient than simplex! That is, a network of relatively
[snip]

> up and you can have a network that, overall, is much *more* reliable
> than DX simplex thanks to the shorter inter-node propagation paths.
[snip]

> work DX on HF. You just wouldn't necessarily do it
> directly. Unfortunately, for a lot of hams this wouldn't be the
> same.

There's a few edited clips that I think sum up the angle you seem to be taking on this issue. I've already said my peice here, but I have just a few more comments.

You have quite rightly noted two things, 1. that spread spectrum culture is quite different from traditional amateur culture, and 2. that spread spectrum can make much more efficient *use* of RF resources.

One has got to ask, taking a wide view of amateur radio in general, how important ultimate efficiency is, and why amateur culture is the way it is.

The valid arguments based on efficiency are more in line with commercial objectives for the use of spectrum. They are more concerned with maximum number of users, level of service, and end user features. If amateur radio is operated according to such commercial objectives, it would make perfect sense for authorities to SELL the spectrum to commercial interests, since they will be able to provide the same type of service, supplemented with other telecoms, and may well be able to provide an even more efficient and reliable service, while making money for the authorities and the telecommunications industry.

There are already bands allocated for these services, and commercial interests are operating on them. Amateur radio has always *justified*its* *existence*, not as an end user service provider (that all but regulated against), but as an experimental service for the self training of amateurs in the techniques of radio communications. This is all encompassing, covering a wide variety of modes and applications and is for everyone from the beginner to the expert. One mode cannot take precedence at the expense of all others. Efficiency at the expense of the aims and diversity of the service cannot be justified. As a cooperative additional mode, efficiency would be welcomed, as was SSB. But SS has a long way to go before it could be accepted as such, if at all.

'You can have any colour you like, so long as its black.' - another expert in efficiency and commercialism.

Rob

From jlbloom@connix.com Fri Aug 02 07:46:38 1996
Received: from comet.connix.com (comet.connix.com [198.69.10.4]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id HAA07144 for <hfsig@tapr.org>; Fri, 2 Aug 1996 07:46:36 -0500 (CDT)
Received: from jlbloom.connix.com (jlbloom.connix.com [205.246.105.188]) by comet.connix.com (8.6.5/8.6.5) with SMTP id IAA14517 for <hfsig@tapr.org>; Fri, 2 Aug 1996 08:46:32 -0400
Received: by jlbloom.connix.com with Microsoft Mail
id <01BB804F.370D2280@jlbloom.connix.com>; Fri, 2 Aug 1996 08:47:19 -0400
Message-ID: <01BB804F.370D2280@jlbloom.connix.com>
From: Jon Bloom <jlbloom@connix.com>
To: "'hfsig@tapr.org'" <hfsig@tapr.org>
Subject: RE: [HFSIG:1410] Re: SS on HF
Date: Fri, 2 Aug 1996 00:46:50 -0400
MIME-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Content-Transfer-Encoding: 7bit

Johan Forrer.[SMTP:forrerj@peak.org] wrote:

>To help me understand it a bit better: how much power (EIRP) would that
>single SS station need to run to be 20 dB over your DX station?
>
>Assume for argument sake that its a station in another state thats running
>DS SS spread over 1 MHz bandwidth thats not skip to you; he's beaming in
>your direction and that you receive the DX at S1 level?

Why would you assume he's in another state? I'd be more interested in the case where he's on the other side of town. Put it another way: that SS station may be in another state from me, but he's on the other side of town from *somebody.* With a decent receiver, I can handle a narrowband signal on the other side of town.

Over the past 20 years or so we hams have beat on the receiver manufacturers to make them design radios with 100+ dB of dynamic range. What that means is that we expect to be able to handle off-channel signals that are 100+ dB above the noise floor. The reason we want that kind of performance is because we *get* signal levels like that entering our receivers. Say there's a narrowband station nearby that I'm receiving at a level just within the 100-dB dynamic range of my receiver, so I'm not experiencing interference from his signal. If he now switches over to SS, he must reduce power and/or spread his signal to reduce the signal received in my receiver within the passband by 100 dB to be at my noise floor. (Of course, I'm willing to cut a few dB of slack.) Is that feasible? That's the question.

By the way, just what HF band do you plan to use for a 1-MHz-wide signal?

-- Jon

From LANIER.R.A-@smtpgty.bwi.wec.com Fri Aug 02 08:19:57 1996
Received: from tron.bwi.wec.com (tron.bwi.wec.com [129.228.4.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id IAA08351 for <hfsig@tapr.org>; Fri, 2 Aug 1996
08:19:49 -0500 (CDT)
Received: from smtpgty.bwi.wec.com by tron.bwi.wec.com;
(5.65/1.1.8.2/31May95-0229PM)
id AA05651; Fri, 2 Aug 1996 09:05:31 -0400
Received: from ccMail by smtpgty.bwi.wec.com
(IMA Internet Exchange 2.0 Enterprise) id 201FFA80; Fri, 2 Aug 96 09:16:24 -0400
Mime-Version: 1.0
Date: Fri, 2 Aug 1996 09:09:30 -0400
Message-Id: <201FFA80.1858@smtpgty.bwi.wec.com>
From: LANIER.R.A-@smtpgty.bwi.wec.com (LANIER.R.A-)
Subject: Re: [HFSIG:1407] Re: Shared SS
To: hfsig@tapr.org
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Description: cc:Mail note part

Are you saying that his COMPUTER is causing the interference? I find
it hard to believe he is causing that much interference 'down the
street.'

73s de
Tony, KE4AT0

----- Reply Separator -----
Subject: [HFSIG:1407] Re: Shared SS
Author: hfsig@tapr.org at BALT.SMTP
Date: 8/1/96 2:59 PM

At 12:50 01/08/96 -0500, you wrote:

> I'd like to know a little more about this 'computer brat down the
> street.' How do you know he is using SS?

He isn't actually. In fact he is a member of Joe Public who has just
turned his P.C on (The grey box with all the wires hanging out the back).

:- }

- Charles

From forrerj@peak.org Fri Aug 02 09:52:23 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id JAA11297 for <hfsig@tapr.org>; Fri, 2 Aug 1996
09:52:16 -0500 (CDT)
Received: from p02.t0.monrotel.com (p02.t0.monrotel.com [198.68.25.35]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id HAA06591 for <hfsig@tapr.org>; Fri, 2 Aug
1996 07:52:29 -0700
Message-Id: <199608021452.HAA06591@PEAK.ORG>

X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 02 Aug 1996 07:40:30 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1416] Re: SS on HF

Hi Jon,

>Why would you assume he's in another state? I'd be more interested in the
>case where he's on the other side of town. Put it another way: that SS
>station may be in another state from me, but he's on the other side of
>town from *somebody.* With a decent receiver, I can handle a narrowband
>signal on the other side of town.

I agree that local interference might be very strong. However, my experience being an avid CW operator (I have a piece of wallpaper saying I won the CQWW CW single band single op contest once upon a time), is the big signals from elsewhere, not from local sources. So, thats what I was theorizing about a bit.

>
>Over the past 20 years or so we hams have beat on the receiver manufacturers
>to make them design radios with 100+ dB of dynamic range. What that means
>is that we expect to be able to handle off-channel signals that are 100+ dB
>above the noise floor. The reason we want that kind of performance is because
>we *get* signal levels like that entering our receivers. Say there's a
>narrowband station nearby that I'm receiving at a level just within the
>100-dB dynamic range of my receiver, so I'm not experiencing interference
>from his signal. If he now switches over to SS, he must reduce power and/or
>spread his signal to reduce the signal received in my receiver within the
>passband by 100 dB to be at my noise floor. (Of course, I'm willing to cut
>a few dB of slack.) Is that feasible? That's the question.

Yes, thats basically the gist of what I was after. How much power would it take from a remote DS SS station to raise the noise floor to 20 dB over a weak (say S1 level) DX signal. Just curious, because I suspect it would be enormous (by amateur standards).

>
>By the way, just what HF band do you plan to use for a 1-MHz-wide signal?
>
>-- Jon
>
>

Just a theoretical question to see if I understand the nature of the SS PSD implications. Perhaps you can give some insight; Would any degree of QSY have an effect, i.e., how white is the spectrum really if there we have light SS occupancy?

Thanks,

--Johan

From choffman@pelican.davlin.net Fri Aug 02 13:08:19 1996

Received: from pelican.davlin.net (root@pelican.davlin.net [206.245.221.3]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id NAA17981 for <hfsig@tapr.org>; Fri, 2 Aug 1996 13:08:16 -0500 (CDT)

Received: from davlin.davlin.net (cc-dup-55.davlin.net [206.245.221.55]) by pelican.davlin.net (8.6.12/8.6.9) with SMTP id NAA28468 for <hfsig@tapr.org>; Fri, 2 Aug 1996 13:17:25 -0500

Message-ID: <3202439F.3957@pelican.davlin.net>

Date: Fri, 02 Aug 1996 13:06:23 -0500

From: Charles Hoffman <choffman@pelican.davlin.net>

Reply-To: choffman@pelican.davlin.net

Organization: K5SBU

X-Mailer: Mozilla 3.0b5aGold (Win95; I)

MIME-Version: 1.0

To: hfsig@tapr.org

Subject: Re: [HFSIG:1414] Re: Shared SS

References: <Pine.ULT.3.91.960802091805.15741A-1000000@dxcern.cern.ch>

Content-Type: text/plain; charset=us-ascii

Content-Transfer-Encoding: 7bit

Frode Weierud wrote:

>

> On Thu, 1 Aug 1996, Walt DuBose - K5YFW wrote:

>

> > Way back there in my AFRes days, we were running SSB on several
> > channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the spooks
> > about 300 meters were running SS between 3 -15 MHz to the same
> > locations that we were.
> > didn't matter if they were on-the-air or not, it had no
> > affect on our communications and I don't recall seeing an
> > increase in channel noise...it darn sure didn't bother the marine
> > CW station on the channel adjacent to our main channel (frequency).
> > Also, there was another spook station located about 5 miles away
> > and we couldn't tell when either was transmitting unless we called
> > them on the fieldfone and asked. I might also mention that they
> > were running broadband antennas and we were running dipoles so our
> > antennas were better.

I have known Walt many years; his military comms experience is more valid here than supposition of what a hypothetical computer guy down the street will do or whatever hypothetical situation imagined. We need to pay attention to Walt's experience reported here.

> >

>

> As far as I know we already have SS transmissions on most if not all of
> our HF bands. ... a military installation using SS
> on HF...asked them if blanked out the amateur bands and marine
> bands etc. The answer was NO... they were equipped with 1KW and 10KW power
amplifiers ...antennas were LPAs

Typical of HF SS mil/gov systems I am familiar with.

> Their main reason for using SS is the low probability of intercept and
> anti-jamming properties.

Exactly the point!

>
> It would be interesting to hear if anybody else have some experience from
> military/government use of SS on HF, and specially if anybody is situated
> close to such an installation they could perhaps let us know if they have
> ever been able to detect the presence of SS signals.

My amateur radio station is situated on a ranch in South Texas eight miles directly off the backside of the recently installed "over the horizon radar" (OHR) built by Raytheon. My best guess is that collectively (multiple amps), feeding 13 phased LPA's run about 200,000 to the antennas (not erp). Frequency range, from observing the two banks of LPAs appears to cover from 4 MHz to 30 MHz. The system apparantly uses various modulation methods but the mode is SS, and it does cover the complete spectrum including amateur radio frequencies.

Considering the power, the nature of the LPA F/B characteristics and the distance to the antenna, it is significant that I did not have any harmful interference, including noticable receiver frontend sensitivity reduction. During their testing phase I sometimes could tell when they were on the air. Sometimes, and barely discernable. Later under normal operations I never hear them.

By comparison, from the same site they have two propogation measurement devices. One is an oblique chirp sounder which squirts away from me and the other is a F1F2 height sweep sounder using a NVIS dipole. The later runs 10KW, and sweeps the spectrum of interest with what sounds like a A1 carrier. It sweeps through my receiver passband in no more than 400ms but eats my lunch. The receiver is useless for three or four seconds. The s-meter always hits the far peg with a "clink"!

The LPA-backside SS signal is considerably greater rf field at my QTH than the sounder signal but is unnoticed. I have heard it however; one of the modes sounds like tinkling ice cubes in a pitcher of iced tea, as its being poured. I do believe that is what killed the grass at the ranch, not the drought.

Hope this is of some interest. 73 Rik K5SBU

>
> 73's Frode, F/LA2RL
>
> Frode Weierud Phone : +41 22 7674794
> CERN, SL, CH-1211 Geneva 23, Fax : +41 22 7679185
> Switzerland E-mail : Frode.Weierud@cern.ch

From alanb@polecat.sr.hp.com Fri Aug 02 15:02:56 1996

Received: from hpcsos.col.hp.com (hpcsos.col.hp.com [15.255.240.16]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id PAA22462 for <hfsig@tapr.org>; Fri, 2 Aug 1996 15:02:48 -0500 (CDT)

Received: from srmail.sr.hp.com by hpcsos.col.hp.com with ESMTP

(1.37.109.16/15.5+IOS 3.14) id AA145426154; Fri, 2 Aug 1996 14:02:34 -0600

Received: from polecat.sr.hp.com (algae.sr.hp.com) by srmail.sr.hp.com with ESMTP
(1.37.109.16/15.5+ECS 3.3) id AA131426008; Fri, 2 Aug 1996 13:00:09 -0700
Received: by polecat.sr.hp.com
(1.37.109.16/15.5+ECS 3.3) id AA220946008; Fri, 2 Aug 1996 13:00:08 -0700
From: Alan Bloom <alanb@polecat.sr.hp.com>
Message-Id: <199608022000.AA220946008@polecat.sr.hp.com>
Subject: SS on HF
To: hfsig@tapr.org
Date: Fri, 2 Aug 1996 13:00:07 -0800 (PDT)
X-Mailer: ELM [version 2.4 PL21]
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

forrerj@peak.org (Johan Forrer.) said:

>>>2) How many SS participants does it take to start raising the noise floor to
>>a point where it becomes objectionable? 2, 10, 100, 1000 ? ...
>>
>>It only takes 1 if he is more than 20 dB or so louder than the signal you
>>are trying to receive.
>
>To help me understand it a bit better: how much power (EIRP) would that
>single SS station need to run to be 20 dB over your DX station?
>
>Assume for argument sake that its a station in another state thats running
>DS SS spread over 1 MHz bandwidth thats not skip to you; he's beaming in
>your direction and that you receive the DX at S1 level?

The propagation loss varies widely with different paths. At any given time, signals on a DX band typically vary from the noise level (less than a tenth of a microvolt, around -130 dBm) up to the millivolt range, -30 dBm or so. (This assumes skywave propagation. It can be worse if there is another ham station in your neighborhood.) A good communications receiver's blocking level might be around 0 dBm, so it can handle typical band conditions with no problems. But if one of those -30 dBm signals has spread its signal over a 300 kHz band, it will be putting -50 dBm interference into each 3 kHz narrow-band channel.

You would have to reduce the power by something on the order of 80 dB in order not to cause interference. 80 dB below a legal-limit 1500W signal is 15 microwatts, much too low for reasonable communications capability on HF. You can argue with my numbers, but you would have to find a very large error in them in order to invalidate my argument.

If the spread spectrum signal is a frequency-hopping type, then it will be putting a full-strength (non-spread) signal into each channel at some repetitive rate. In order to cause no interference at all, the power must be reduced even 20 dB more than for the example above. True, frequency hopping does reduce the percentage of time that the interference occurs, but that percentage increases the more SS stations there are operating on the band at any given time.

AL N1AL

From karn@unix.ka9q.ampr.org Fri Aug 02 17:54:39 1996
Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id RAA00548 for <hfsig@tapr.org>; Fri, 2 Aug 1996 17:54:35 -0500 (CDT)
Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id PAA05002; Fri, 2 Aug 1996 15:46:39 -0700 (PDT)
Date: Fri, 2 Aug 1996 15:46:39 -0700 (PDT)
Message-Id: <199608022246.PAA05002@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <199608011432.HAA07242@ravel.n2.net> (k6sti@n2.net)
Subject: Re: [HFSIG:1400] Shared SS
Reply-To: karn@qualcomm.com

>Narrowband users already dynamically share spectrum. They QSY to avoid QRM.

That's not dynamic enough. You're still dedicating a chunk of spectrum to a particular QSO for as long as it lasts. It goes to waste whenever neither party is talking, and even during speech pauses during a transmission.

The kind of dynamic sharing I'm talking about exploits the peak/average ratios of voice conversation, not to mention the enormously larger ratios present in most computer communications that is the rationale for packet switching. It puts all the users and all the spectrum in one big pool to exploit the law of large numbers.

Qualcomm CDMA does exactly this with its variable rate vocoder. When you talk, the data rate kicks up to 9.6 kb/s (or 14.4 kb/s in newer systems). When you stop talking, it drops back to 1.2 kb/s. The average data rate is something like 40% of the peak in a typical conversation.

A typical CDMA sector handles 25-35 calls in each 1.25 MHz RF channel, and that's enough to gain considerable benefit from pooling. Only if everyone talks at exactly the same moment do you hit the limit, and the probability of that goes down as you make the pool larger.

Again, I won't give you a guarantee that SS will **never** cause interference. I can't, though I can certainly improve the odds with power control, efficient coding and adaptive hopping patterns. But it's just unrealistic to hold SS to such a high standard when narrowband operations are not. QRM has always been a way of life on the shared HF bands, and the best we can do is to promote methods that reduce it on average.

Phil

From forrerj@peak.org Fri Aug 02 18:38:07 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id SAA02623 for <hfsig@tapr.org>; Fri, 2 Aug 1996 18:38:04 -0500 (CDT)
Received: from p07.t0.monrotel.com (p05.t0.monrotel.com [198.68.25.38]) by

PEAK.ORG (8.6.13/8.6.7) with SMTP id QAA01803 for <hfsig@tapr.org>; Fri, 2 Aug 1996 16:38:13 -0700
Message-Id: <199608022338.QAA01803@PEAK.ORG>
X-Sender: forrerj@peak.org
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 02 Aug 1996 16:26:23 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1420] SS on HF

Alan,

> A good communications receiver's blocking
> level might be around 0 dBm, so it can handle typical band conditions with
> no problems. But if one of those -30 dBm signals has spread its signal
> over a 300 kHz band, it will be putting -50 dBm interference into each
> 3 kHz narrow-band channel.
>
> You would have to reduce the power by something on the order of 80 dB in
> order not to cause interference. 80 dB below a legal-limit 1500W signal is
> 15 microwatts, much too low for reasonable communications capability on HF.
> You can argue with my numbers, but you would have to find a very large
> error in them in order to invalidate my argument.
>

This is exactly what I was trying to grasp. Thanks for the explanation.

--Johan

From k6sti@n2.net Sat Aug 03 01:26:38 1996
Received: from ravel.n2.net (rael.n2.net [204.250.22.20]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id BAA20325 for <hfsig@tapr.org>; Sat, 3 Aug 1996
01:26:33 -0500 (CDT)
Received: from ppp174.n2.net (ppp174.n2.net [204.250.22.174]) by ravel.n2.net
(8.6.12/8.6.12) with SMTP id XAA06402 for <hfsig@tapr.org>; Fri, 2 Aug 1996
23:26:18 -0700
Date: Fri, 2 Aug 1996 23:26:18 -0700
Message-Id: <199608030626.XAA06402@rael.n2.net>
X-Sender: k6sti@mail.n2.net
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: k6sti@n2.net (Brian Beezley)
Subject: HF SS Demonstration

At this point it seems like everyone has pretty much spoken his piece
regarding the feasibility of mixing spread spectrum and existing HF
narrowband modes.

I'd like to take the discussion one step further by proposing a simulated HF SS demonstration. The demonstration will give anyone with an HF receiver a chance to hear what frequency-hopped signals sound like and to judge their effect on narrowband users.

Here's what I propose: I'll write PC software that hops an HF transceiver around in the 20-meter band. We'll run the transceiver in USB mode and drive it with a controlled audio waveform generated by a sound card. We'll pick a contest-free Saturday and for a 15-minute period, a dozen or more stations across the country simultaneously will transmit simulated SS. Interested parties can listen to the band during this demonstration and make their own judgment about the level of interference generated. You can monitor conversations in progress and listen for comments. You can record what you hear. If you're near one of the simulated SS stations, you can judge the level of near-transmitter QRM; otherwise, you'll have to be content to listen to the skywave signals.

I'll leave it to the SS proponents to specify a power level and devise a waveform and hopping sequence. I'd suggest a maximum of 50 watts RMS output power to avoid overheating barefoot exciters. I'd suggest using a noiselike waveform rather than one with spectral lines to make it audibly less intrusive. For this demo I'm not volunteering to program an adaptive hop algorithm--to do it right would take more time and effort than I'm willing to expend on this experiment.

To simplify things, I'll write the code to control the frequency of a single brand of transceiver. Unfortunately, I don't own a transceiver that can be computer controlled, but I do have access to several locally for testing.

There are a couple of nontechnical issues involved in a test like this. The first is the propriety of intentionally emitting power on the frequency of a QSO in progress without permission or warning. The second concerns the legality of such a test. I expect these issues to be addressed in discussion that follows by those concerned. Personally, I don't have a problem with either as long as the test is brief. Presumably, none of the stations volunteering to transmit SS will either.

I don't propose to publicize this demonstration ahead of time except to announce the time and date on several Internet reflectors a day in advance.

If the SS proponents aren't interested in this demonstration or if I can't scrounge up enough volunteers, I'll drop the idea. Otherwise, who's game?

Brian Beezley, K6STI
k6sti@n2.net

From karn@unix.ka9q.ampr.org Sun Aug 04 16:54:21 1996

Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id QAA07457 for <hfsig@tapr.org>; Sun, 4 Aug 1996 16:54:17 -0500 (CDT)

Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id OAA00779;

Sun, 4 Aug 1996 14:49:40 -0700 (PDT)
Date: Sun, 4 Aug 1996 14:49:40 -0700 (PDT)
Message-Id: <199608042149.0AA00779@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <199608011551.KAA23596@www.kelly-afb.org> (message from Walt
DuBose - K5YFW on Thu, 1 Aug 1996 11:08:55 -0500 (CDT))
Subject: Re: [HFSIG:1401] Re: Shared SS

Way back there in my AFRes days, we were running SSB on several
channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the spooks
about 300 meters were running SS between 3 -15 MHz to the same
locations that we were. Propagation to the location we were both

To be perfectly fair to the "other side", I have to point out that the
process gain (spreading range) here was much larger than a single ham
band. If frequency hopping were used, I'd expect them to be virtually
undetectable except on a wideband spectrum analyzer close to their
transmitter.

Phil

From choffman@pelican.davlin.net Sun Aug 04 18:20:44 1996
Received: from pelican.davlin.net (root@pelican.davlin.net [206.245.221.3]) by
tapr.org (8.7.5/8.7.3/1.9) with SMTP id SAA10889 for <hfsig@tapr.org>; Sun, 4 Aug
1996 18:20:43 -0500 (CDT)
Received: from davlin.davlin.net (cc-dup-72.davlin.net [206.245.221.72]) by
pelican.davlin.net (8.6.12/8.6.9) with SMTP id SAA25024 for <hfsig@tapr.org>; Sun,
4 Aug 1996 18:29:53 -0500
Message-ID: <32052FCB.4A9A@pelican.davlin.net>
Date: Sun, 04 Aug 1996 18:18:35 -0500
From: Charles Hoffman <choffman@pelican.davlin.net>
Reply-To: choffman@pelican.davlin.net
Organization: K5SBU
X-Mailer: Mozilla 3.0b5aGold (Win95; I)
MIME-Version: 1.0
To: hfsig@tapr.org
Subject: Re: [HFSIG:1424] Re: Shared SS
References: <199608042149.0AA00779@unix.ka9q.ampr.org>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Phil Karn wrote:

>
> Way back there in my AFRes days, we were running SSB on several
> channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the spooks
> about 300 meters were running SS between 3 -15 MHz to the same
> locations that we were. Propagation to the location we were both
>
> To be perfectly fair to the "other side", I have to point out that the
> process gain (spreading range) here was much larger than a single ham
> band. If frequency hopping were used, I'd expect them to be virtually

> undetectable except on a wideband spectrum analyzer close to their
> transmitter.
>
> Phil

Interesting, but who's watching? Just be invisible like everyone else on SS! Ho ho. How many amateur radio stations are on the ham bands on SS? How many non amateur stations are on the ham bands on SS? Does it matter? Who is minding the store?

73 Rik K5SBU

From fperkins@onramp.net Sun Aug 04 18:33:19 1996
Received: from mailhost.onramp.net (mailhost.onramp.net [199.1.11.3]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id SAA11358 for <hfsig@tapr.org>; Sun, 4 Aug 1996 18:33:18 -0500 (CDT)
Received: from 199.184.212.190 (stockyard27.onramp.net [199.184.212.190]) by mailhost.onramp.net (8.7.3/8.6.5) with SMTP id SAA13962 for <hfsig@tapr.org>; Sun, 4 Aug 1996 18:33:16 -0500 (CDT)
Date: Sun, 4 Aug 1996 18:33:16 -0500 (CDT)
Message-Id: <199608042333.SAA13962@mailhost.onramp.net>
MIME-Version: 1.0
Content-Type: text/plain
Content-Transfer-Encoding: 7bit
From: fperkins@onramp.net
Subject: Re: [HFSIG:1424] Re: Shared SS
To: hfsig@tapr.org
In-Reply-To: <199608042149.0AA00779@unix.ka9q.ampr.org>
X-Mailer: SPRY Mail Version: 04.00.06.17

Hi Phil and the HF Gang,

I looked around a bit this weekend trying to find a basic discussion on the channel capacity of "random" packet transmissions. I am trying to gain some insight into the "18% barrier".

Could you suggest a reference?

73 Frank WB5IPM

From karn@unix.ka9q.ampr.org Sun Aug 04 19:39:22 1996
Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id TAA14409 for <hfsig@tapr.org>; Sun, 4 Aug 1996 19:39:13 -0500 (CDT)
Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id RAA00887; Sun, 4 Aug 1996 17:34:40 -0700 (PDT)
Date: Sun, 4 Aug 1996 17:34:40 -0700 (PDT)
Message-Id: <199608050034.RAA00887@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <H000029202272ac5@MHS> (Robert.Glassey@nmp.nokia.com)
Subject: Re: [HFSIG:1402] Wide band modes
Reply-To: karn@qualcomm.com

Robert, thanks for your long and thoughtful note. There was so much in there, I just finished digesting it all.

>It is indeed. I have no arguments here. I've long suspected as much,
>although I've never had the numbers that show it. Although even very
>simple ECC can make back most of this 35-40db difference. ie and AMTOR

Quite true. To paraphrase your local real estate agent, three things are most important in dealing with Rayleigh fading: diversity, diversity and diversity. Even simple repetition coding (the simplest form of ECC) is a significant benefit. But properly constructed codes use the redundancy more efficiently, and work better as a result.

>I guess without any extra power, the signal would be above the threshold
>50% of the time. Thus we have a 50% BER. A 1/2 rate ECC would ideally
>deal with this, although I guess a bit more redundancy would be usefull.

A 50% BER corresponds to zero capacity, which is the worst any communication system can do. (If the BER were greater than 50%, you could simply invert it to make the BER less than 50%, and you'd have some non-zero capacity).

Since the capacity of a BSC (binary symmetric channel) with a 50% BER is zero, no code can possibly fix this. However, a BEC (binary erasure channel, i.e., a BSC supplemented with a third "erasure" output) is a different story. The capacity of a BEC, assuming no "hard" errors, is as you expect very close to 1 minus the erasure rate. A rate 1/2 ECC would work pretty well here assuming proper attention is given to interleaving.

>In the light of this 15dB fade margin, I wonder how much effect soft
>decoding would really have. Would erasure decoding be just as good?
>What I'm getting at is PACTOR II's K=9 or is it 11 constraint length.
>Would k=5 be just as good? Or could we just go for plain Reed Solomon
>coding? This would make PC implementation of an HFSIG protocol more
>realistic.

This is a very interesting question. You can think of erasure decoding as a form of "softened" decision decoding where the received symbols can take on three levels (zero, one and "don't know"), and it's certainly true that a little bit of "softness" goes a long way. It does make Reed-Solomon decoders look more interesting since they can handle erasures fairly easily but not full-blown soft decisions.

But I see nothing wrong with Viterbi decoding per se, and there is probably still some gain to be had from soft decision decoding. I think I have some references that can quantify this. Sure, Viterbi is slower than Reed-Solomon but with all the cycles we have these days it's just not a major factor at the data rates we're likely to use. (My K=7 decoder runs at 155 kb/s on a P90).

>But getting back to your spreading argument, I've just suggested

>tripling the bandwidth to overcome fading, or have I?

Exactly!! FEC inherently "spreads" bandwidth, and that makes it as much a "spread spectrum" scheme as frequency hopping or direct sequence chipping. It certainly does cause you to run into the FCC emission bandwidth limits, which are the basic problem here.

>I recall Ungerboch (I can never spell that) said that the solution was
>to go for multi levels, even if you cannot actually resolve each one

I'm not surprised Ungerboch said this. He invented trellis coding, and it's been extremely successful on bandwidth limited channels (e.g., telephone modems). But beyond the inappropriate use of the bandwidth-limited model for the power-limited radio channel, fading introduces some serious practical problems. If the symbols have unequal energy, the demodulator thresholds would depend on signal amplitude, and this changes rapidly and unpredictably with fading. This is in fact one of the most serious drawbacks of on-off-keyed CW. Ever tried to copy it on a channel that's fading at about the same rate as a CW symbol element?

In my opinion, all these higher-order QAM schemes in Clover et al are going down the wrong path. They certainly help account for their extremely high E_b/N_0 requirements when operating at high data rates. It would be much better to let them relax their bandwidth constraints and just scale up their more power-efficient schemes like BPSK to wider channels.

>Not inevitable, but I can still see that a wider band signal will have
>faster fades that are more easily dealt with. I think the wider
>bandwidth helps when you consider interference from other users. Still a
>narrow a bandwidth allows more users in the same wide bandwidth without
>interference. 6 of one, half dozen of another as they say. I don't think
>either can make full use of the bandwidth.

It's not that the fading is faster in the wideband case, it's just another way to get more diversity.

You can get diversity in different ways: time, frequency, space, polarization, etc. All that matters is that the diversity is over sufficient distance to get some independence in the fading. That is, you need to diversify the effect of any given user data bit over considerably more than one coherence time, one coherence bandwidth, etc. It's sufficient to diversify over just one dimension, but you'll need more of it than if you use several. For example, real-time voice may have some serious delay constraints that limit the use of time diversity, so frequency diversity is perhaps even more useful than it would be in a non-real-time packet data system where you could afford to diversify over many seconds of time.

I disagree strongly with the "6 of one, half dozen of the other" characterization. It is very clearly the case that what you spend in bandwidth is more than bought back in extra interference resistance.

This is most clearly the case when the extra bandwidth allows a decrease in E_b/N_0 through coding, but there are other practical benefits from spreading even when the AWGN E_b/N_0 is unaffected (as it is with direct sequence or frequency hopping): the increased "trunking" or "pooling" efficiencies of a large group of users dynamically sharing a large pool of spectrum, and the benefits of frequency diversity that I've already mentioned.

>Hmm, this is interesting, especially the 5dB increase over the BPSK
>case. I wonder what it would be over the 64-QAM case.

The literature I have doesn't give any results for QAM since it's considered inappropriate for the fading channel. Even coherent BPSK is inappropriate because of the difficulty in tracking carrier phase (differentially detected BPSK is recommended instead.)

>How resistant would this M-ARY scheme be to other signals? I wonder if

Depends on the nature of the QRM. Continuous unmodulated carriers could be handled rather easily with adaptive notch filters. But strong intermittent QRM would be harder to deal with. That's why you really want to combine this with frequency hopping; by using only a small subset of all the available frequencies at any given time, you reduce the chances of landing on strong QRM to where coding can easily handle it.

>I'm actually fairly well convinced that with a properly designed digital
>radio, with a wide bandwidth and demod controlled AGC could overcome the
>near far problem quite well, especially if spread enough so that local
>impulses cause a BER of < 10%. I even like the idea!

Great!

>The concern is about sharing the band with other users. I don't think

I agree, and actually that's why I would support dividing up the band into "DX" and "regional" subbands to mitigate the near-far problem. Each subband would still allow wideband modulation within it, but only for the right purpose (i.e., DX or local). I think this would go a long way towards solving the problem, don't you?

Phil

From karn@unix.ka9q.ampr.org Mon Aug 05 00:05:26 1996

Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id AAA25901 for <hfsig@tapr.org>; Mon, 5 Aug 1996 00:05:19 -0500 (CDT)

Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id WAA01008; Sun, 4 Aug 1996 22:00:45 -0700 (PDT)

Date: Sun, 4 Aug 1996 22:00:45 -0700 (PDT)

Message-Id: <199608050500.WAA01008@unix.ka9q.ampr.org>

From: Phil Karn <karn@unix.ka9q.ampr.org>

To: hfsig@tapr.org

In-reply-to: <199608011902.MAA06926@PEAK.ORG> (forrerj@peak.org)

Subject: Re: [HFSIG:1406] Re: Advantages of SS
Reply-To: karn@qualcomm.com

>1) If assumed that the center frequency of different DS SS operations are
>randomly chosen, what would that do to the near-far problem, i.e., if you
>use DS SS and experiencing interference from your neighbor DS SS operator,
>why not QSY out of harm's way of the offending signal envelope? This assumes
>that contacts are initially established on some known frequency. Am I right
>in assuming that if only two parties are involved in DS SS, that the PSD
>does have a maxima somewhere, even though it is a wideband, i.e, not quite
>white over the full bandwidth?

Johan,

You assume that there's little if any filtering after the spreading operation. Most real systems I know do in fact filter, both to flatten the in-band spectrum and to knock off the $\sin(x)/x$ sidelobes. Qualcomm CDMA uses a particularly sharp FIR filter because of cellular carrier requirements. To get the sharp skirts we let the passband ripple somewhat. The resulting display on a spectrum analyzer closely resembles the top of Bart Simpson's head, so around here we often call each composite CDMA waveform a "Bart's head".

>2) How many SS participants does it take to start raising the noise floor to
>a point where it becomes objectionable? 2, 10, 100, 1000 ? If the number is
>1000, would it be realistic, given a comparable narrow-band situation, to
>expect anyone to be able to conduct a QSO with that occupancy? Like a
>contest with 1000 RTTY operators calling simultaneously in the 14.090 -
>14.065 20 meter segment.

This depends on the process gain, required E_b/N_0 s and relative signal strengths. The math is actually pretty straightforward.

Consider a DS/SS system with coding and spreading such that an E_b/N_0 of 6 dB is required and the ratio of RF bandwidth to user data rate is 128:1. (These are the approximate parameters of Qualcomm CDMA).

The process gain is $10 \cdot \log_{10}(128) \approx 21$ dB. For a required E_b/N_0 of 6 dB, the overall SNR required is $6 - 21 = -15$ dB. This figure is sometimes referred to as E_c/I_0 , the ratio of the energy per chip to the interference spectral density.

If everyone's power is matched at the receiver, you can tolerate as many as 31.6 other users before their aggregate interference brings the E_b/N_0 down to 6 dB. Note this is less than the 128 users you could theoretically support by just dividing up the total bandwidth into 128 equal size pieces. But that assumes no thermal noise, i.e., that it would be easy to operate at the higher E_b/N_0 that's required without bandwidth-expanding coding, especially on a fading channel. It also ignores any savings from better dynamic sharing, and it ignores the benefits from being able to geographically reuse frequencies more densely because of the far greater resistance to co-channel interference.

Phil

From karn@unix.ka9q.ampr.org Mon Aug 05 00:31:01 1996
Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id AAA28711 for <hfsig@tapr.org>; Mon, 5 Aug 1996 00:30:58 -0500 (CDT)
Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id WAA01021; Sun, 4 Aug 1996 22:26:25 -0700 (PDT)
Date: Sun, 4 Aug 1996 22:26:25 -0700 (PDT)
Message-Id: <199608050526.WAA01021@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <199608012031.AA171931499@polecat.sr.hp.com> (message from Alan Bloom on Thu, 1 Aug 1996 15:35:02 -0500 (CDT))
Subject: Re: [HFSIG:1408] SS on HF bands
Reply-To: karn@qualcomm.com

>Spread spectrum works fine for something like a cellular telephone system
>where the locations and power levels of all stations are well-controlled.
>But on the amateur bands, stations are randomly distributed.

Most cellular users are randomly distributed too. But they do generally talk only to the nearest base station.

A somewhat better model is the DARPA SURAN (Survivable Radio Network) project of the 1970s and 1980s. It assumed randomly distributed packet radios operating in a simplex fashion. It used spread spectrum.

>If that nearby interfering station is using wide-band modulation, then the
>interference potential is much greater, even though the *average* power
>may be less. A decent communications receiver can handle narrowband
>interference around 100 dB stronger than the noise level. Spreading the
>interfering signal by, say, a factor of 100 only reduces the interference
>by 20 dB. Narrowband has something like an 80 dB advantage over
>broadband in this regard.

This is true as far as it goes, but 100 dB adjacent channel rejection seems a little generous. 60 dB is a more reasonable estimate, I think. Whatever.

>Cellular-style communications doesn't work on DX bands, because
>nearby stations are typically very much weaker than distant stations.
>(Because ground wave propagation is much lossier than sky wave.)

Ah, but wouldn't this tend to mitigate the near-far problem?

>(Much ad-hominum argument against narrow-band modulation omitted.)

I don't see why you have to label this "ad-hominum". I think it's a fair characterization of the "ham ethic" as I see it.

I guess it boils down to what you think ham radio is all

about. Reliable communications? That description hardly fits direct long-haul HF. Easily accessible to those without large lots, liberal housing covenants and money for big antennas and power amplifiers? I think not. The popularity of VHF/FM and repeater networks shows there are a lot of hams who are interested primarily in reliable local communications with small stations, and who aren't purists when it comes to using relays. Spread spectrum promises to provide the same capabilities over wider areas on HF.

I confess that perhaps my view of ham radio is somewhat different than yours. About the only activity that has a hope of justifying our bands for very long is technical self-training, experimentation and advancement. That means keeping up with the state of the art in the non-amateur world, and spread spectrum is certainly one technology where we trail the commercial and military world. While I don't really have anything against DXing and contesting, I really don't see how they help justify ham radio's existence to the outside world; they're really little more than technological stamp-collecting.

I don't want to do away with traditional hamming, but I don't want it to choke experimentation either. While I can't guarantee that there won't ever be any SS interference to narrowband modes, I think it can be minimized by careful system design and operational coordination. And whatever risks there are will be worth the benefits. After all, ours is not a critical safety-of-life service like aviation; we're supposed to be experimenters, and experiments can fail. That's part of the process.

Phil

From karn@unix.ka9q.ampr.org Mon Aug 05 01:41:34 1996
Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id BAA01348 for <hfsig@tapr.org>; Mon, 5 Aug 1996 01:41:32 -0500 (CDT)
Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id XAA01066; Sun, 4 Aug 1996 23:36:58 -0700 (PDT)
Date: Sun, 4 Aug 1996 23:36:58 -0700 (PDT)
Message-Id: <199608050636.XAA01066@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <H0000292022934c2@MHS> (Robert.Glassey@nmp.nokia.com)
Subject: Re: [HFSIG:1415] SS and the Amateur culture
Reply-To: karn@qualcomm.com

>One has got to ask, taking a wide view of amateur radio in general, how
>important ultimate efficiency is, and why amateur culture is the way it
>is.

A very good question.

>There are already bands allocated for these services, and commercial

>interests are operating on them. Amateur radio has always *justified*its*
>*existence*, not as an end user service provider (that all but regulated
>against), but as an experimental service for the self training of
^^

BINGO!!

How much serious, state-of-the-art experimentation is going on right now
in amateur radio? You mention single sideband, but that was a long time
ago. As the saying goes, what has ham radio done for the world lately?

Indeed, ham radio doesn't exist in a vacuum. It is not just a hobby.
It is given spectrum that could otherwise be sold for big bucks
because it supposedly gives something back to society as a whole. Now
that emergency communications and international good will have largely
been taken over by cellular telephones and the Internet, respectively,
what's left? Technical experimentation and self-training! How much of that
really goes on in ham radio these days? Not much. Even worse, the rules
are set up to discourage it. That's what I want to change.

Phil

From karn@qualcomm.com Mon Aug 05 02:37:03 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org
(8.7.5/8.7.3/1.9) with ESMTP id CAA03055 for <hfsig@tapr.org>; Mon, 5 Aug 1996
02:37:02 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id
AAA05953; Mon, 5 Aug 1996 00:36:30 -0700 (PDT)
Date: Mon, 5 Aug 1996 00:36:30 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608050736.AAA05953@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <199608042333.SAA13962@mailhost.onramp.net> (fperkins@onramp.net)
Subject: Re: [HFSIG:1426] Re: Shared SS

>on the channel capacity of "random" packet transmissions. I am trying
>to gain some insight into the "18% barrier".

That's the original Aloha result. Keep in mind the conditions: a
single narrowband channel; two or more transmissions always result in
a collision, i.e., there is no capture effect; there is no channel
sensing, so stations transmit whenever they want.

Spread spectrum has entirely different results because collisions are
"soft". That is, you can have many stations transmitting at once. At
some point the background interference will be too great to get
through, but that happens at a load much greater than 2 active
transmitters. And again the law of large numbers kicks in, so you can
get much closer to the carrying capacity of the channel than you could
on a single narrowband (no capture) channel.

Phil

From karn@unix.ka9q.ampr.org Mon Aug 05 03:04:24 1996
Received: from unix.ka9q.ampr.org (karn@unix.ka9q.ampr.org [129.46.90.35]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id DAA03874 for <hfsig@tapr.org>; Mon, 5 Aug 1996 03:04:22 -0500 (CDT)
Received: (from karn@localhost) by unix.ka9q.ampr.org (8.7.4/8.7.3) id AAA01117; Mon, 5 Aug 1996 00:59:48 -0700 (PDT)
Date: Mon, 5 Aug 1996 00:59:48 -0700 (PDT)
Message-Id: <199608050759.AAA01117@unix.ka9q.ampr.org>
From: Phil Karn <karn@unix.ka9q.ampr.org>
To: hfsig@tapr.org
In-reply-to: <H000029202272ac5@MHS> (Robert.Glassey@nmp.nokia.com)
Subject: Re: [HFSIG:1402] Wide band modes
Reply-To: karn@qualcomm.com

>How resistant would this M-ARY scheme be to other signals? I wonder if
>different convolution codes could be used to provide further resistance
>between signals (getting very spread spectrum like now), with some
>sequential soft decoding being used to distinguish between the different
>stations, rather than just using a majority vote detector. Could this
>provide enough resistance to other stations on the same channel? It may
>be possible to decode 100% a weaker station while a much stronger
>station, or two use the same channel. MARY FSK seems to have quite an
>advantage here.

I meant to comment on the latter part of this paragraph.

You are exactly right -- different convolutional codes can indeed be used to differentiate between signals; it's an entirely viable form of CDMA. If the code rate is low enough, then this is virtually identical to coded direct sequence spread spectrum! In fact, Andrew Viterbi invented such a scheme a few years ago and published a paper about it.

I'm not sure it is of real benefit, though, since you can do almost as well by using a common high rate code (e.g., rate 1/3 or 1/2) and then chipping the encoded symbols with different PN codes in a more conventional direct sequence system.

Although the lower rate code of Viterbi's scheme would give somewhat greater coding gain, most of the gain in a code comes in the first factor of 1/2-1/4 or so. Ultra-low code rates with distinct polynomials for each encoded symbol doesn't gain enough to be worthwhile yet from a complexity standpoint over simply repeating the symbols from a relatively high rate coder -- and that's what the PN chipping effectively does.

Again, the name of the game on a fading channel is *diversity*. Coding and interleaving gives you diversity in the time domain, assuming the interleaving span is much greater than the coherence time. It can also give you some diversity in the frequency domain if the code rate is low enough to increase the signal bandwidth significantly beyond the coherence bandwidth. But just as simple repetition is a viable (if not ideal) form of diversity in the time domain, so it is in the frequency domain -- and that's what direct sequence chipping or frequency

hopping both do.

BTW, the original wideband system that John Costas analyzed in his 1959 paper "Poisson, Shannon and the Radio Amateur" was essentially simple "frequency repetition". That is, he divided up his RF energy across N identical copies in frequency of the analog waveform and recombined them on the receiving end. Even with this relatively weak form of coding (a scheme he described as "intuitively ridiculous"), he found noticeable improvements in band capacity.

Phil

From Robert.Glassey@nmp.nokia.com Mon Aug 05 06:06:38 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id GAA08314 for <hfsig@tapr.org>; Mon, 5 Aug 1996 06:06:24 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id OAA19295 for <hfsig@tapr.org>; Mon, 5 Aug 1996 14:05:40 +0300

Received: from by samail01.nmp.nokia.com with SMTP

(1.37.109.16/16.2) id AA018962925; Mon, 5 Aug 1996 14:02:05 +0300

X-Openmail-Hops: 2

Date: Mon, 5 Aug 96 11:52:51 +0100

Message-Id: <H0000292022b01a5@MHS>

In-Reply-To: <3202439F.3957@pelican.davlin.net>

Subject: Military SS systems

Mime-Version: 1.0

To: hfsig@tapr.org

Content-Type: text/plain; charset=ISO-8859-1; name="Military"

Content-Transfer-Encoding: 7bit

On Thu, 1 Aug 1996, Walt DuBose - K5YFW wrote:

> Way back there in my AFRes days, we were running SSB on several
> channels in the 8.4 - 8.9 MHz and in the 11.5 MHz range and the
> spooks about 300 meters were running SS between 3 -15 MHz to the same
> locations that we were. didn't matter if they were on-the-air or not,
> it had no affect on our communications and I don't recall seeing an
> increase in channel noise...it darn sure didn't bother the marine CW
> station on the channel adjacent to our main channel (frequency). Also,
> there was another spook station located about 5 miles away and we
> couldn't tell when either was transmitting unless we called them on
> the fieldfone and asked. I might also mention that they were running
> broadband antennas and we were running dipoles so our antennas were
> better.

Rik K5SBU wrote:

> My amateur radio station is situated on a ranch in South Texas eight
> miles directly off the backside of the recently installed "over the
> horizon radar" (OHR) built by Raytheon. My best guess is that
> collectively (multiple amps), feeding 13 phased LPA's run about
> 200,000 to the antennas (not ERP). Frequency range, from observing
> the two banks of LPAs appears to cover from 4 MHz to 30 MHz. The
> system apparently uses various modulation methods but the mode is SS,
> and it does cover the complete spectrum including amateur radio
> frequencies.
> Considering the power, the nature of the LPA F/B characteristics and
> the distance to the antenna, it is significant that I did not have any
> harmful interference, including noticeable receiver frontend
> sensitivity reduction.

These are very interesting results. Is your station behind the LPAs? Do they ever point in your direction? Have you attempted (out of interest) to measure interference in front of the LPAs say at a mile or two? Do the LPAs point away from built up areas?

Over the weekend I did a series of tests on 18MHz with low power pulsed transmissions to determine their range and interference potential. I'll post a report soon, however I was able to hear 10mW 2ms carrier bursts at a distance of 1 mile, and 1W 2ms bursts at 3 miles, using a handheld scanning receiver with a 70cm long whip antenna!

So how do the military do it? Are they really using kilowatts of power? How short are their bursts?

It would be very interesting to get a wide band receiver (4-30MHz) with a fast envelope detector, and very fast peak hold and bring it close to the SS installation in Texas. Surely this would make the TX power detectable, allowing comparisons with other TX sources, and giving an idea of how the signal is spread.

I expect the military have spent millions on reducing interference (Low probability of detection) and they use extremely wide bandwidths. A radar may well have quite different characteristics compared to a communications system.

I expect most of their techniques are classified, but there must be something we can learn from them. From my tests a simple hopping 2ms burst is unacceptable. How do they do it??

My tests suggest that a DSSS system with 10 microwatts power in 2.4kHz (100mW in 24MHz) would be detectable at 3 miles. A 10mW carrier 2.4kHz SNR is about 0dB (still audible above the noise) at 3 miles using a 70cm long unmatched whip antenna - shown to be at least 30dB less sensitive than a reasonable amateur station in the presence of ambient noise.

Cheers,

Rob, G0VTQ

From Robert.Glassey@nmp.nokia.com Mon Aug 05 06:14:17 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id GAA08387 for <hfsig@tapr.org>; Mon, 5 Aug 1996 06:14:14 -0500 (CDT)
From: Robert.Glassey@nmp.nokia.com
Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id OAA19884 for <hfsig@tapr.org>; Mon, 5 Aug 1996 14:13:41 +0300
Received: from by samail01.nmp.nokia.com with SMTP (1.37.109.16/16.2) id AA024483406; Mon, 5 Aug 1996 14:10:06 +0300
X-Openmail-Hops: 2
Date: Mon, 5 Aug 96 12:07:09 +0100
Message-Id: <H0000292022b01b2@MHS>
In-Reply-To: <199608030626.XAA06402@ravel.n2.net>
Subject: [HFSIG:1423] HF SS Demonstration
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

Hi Brian.

> I'd like to take the discussion one step further by proposing a
> simulated HF SS demonstration.

Aha! exactly what I was thinking. I did just this last weekend. I'll post a report soon.

> Here's what I propose: I'll write PC software that hops an HF
> transceiver around in the 20-meter band. We'll run the transceiver in
> USB mode and drive it with a controlled audio waveform generated by a
> sound card.

We think alike! This is almost exactly how I did it! except I only used one SSB channel and transmitted no output when the frequency should have been in some other channel.

> We'll pick a contest-free Saturday and for a 15-minute
> period, a dozen or more stations across the country simultaneously
> will transmit simulated SS.

.. and I only had one TX and measured interference at a range of 1-5 miles with a hand held scanner.

> I'll leave it to the SS proponents to specify a power level and devise
> a waveform and hopping sequence. I'd suggest a maximum of 50 watts
> RMS output power to avoid overheating barefoot exciters. I'd suggest
> using a noiselike waveform rather than one with spectral lines to make
> it audibly less intrusive.

Tried this, but this form of partical spread does not appear to make the sound any more acceptable, or more difficult to hear. My tests were 10mW to 1 Watt, and resulted in significant interference.

Rob

From n4cnw@pig.net Mon Aug 05 08:01:25 1996
Received: from mail.praxis.net (bigpig.pig.net [205.160.243.2]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id IAA11941 for <hfsig@tapr.org>; Mon, 5 Aug 1996 08:01:23 -0500 (CDT)
Received: from s402446 (s402446.orl.mmc.com) by mail.praxis.net with SMTP id AA16771
(5.67b/IDA-1.5 for <hfsig@tapr.org>); Mon, 5 Aug 1996 09:01:51 -0400
Message-Id: <3205F09F.33C0@pig.net>
Date: Mon, 05 Aug 1996 09:01:19 -0400
From: Mike Murphree <n4cnw@pig.net>
X-Mailer: Mozilla 2.02 (Win16; I)
Mime-Version: 1.0
To: hfsig@tapr.org
Subject: Re: [HFSIG:1434] HF SS Demonstration
References: <H0000292022b01b2@MHS>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Robert.Glassey@nmp.nokia.com wrote:

> > Here's what I propose: I'll write PC software that hops an HF
> > transceiver around in the 20-meter band. We'll run the transceiver in
> > USB mode and drive it with a controlled audio waveform generated by a
> > sound card.
>
> We think alike! This is almost exactly how I did it! except I only used
> one SSB channel and transmitted no output when the frequency should have
> been in some other channel.
>
> . and I only had one TX and measured interference at a range of 1-5
> miles with a hand held scanner.
> Tried this, but this form of partical spread does not appear to make the
> sound any more acceptable, or more dificult to hear. My tests were 10mW
> to 1 Watt, and resulted in significant interference.

This sounds pretty slow.. What was the dwell time on each frequency?
What kind of transceiver was used? DDS?

What modulation was used?

Mike

From k6sti@n2.net Mon Aug 05 08:23:31 1996
Received: from ravel.n2.net (rael.n2.net [204.250.22.20]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id IAA13010 for <hfsig@tapr.org>; Mon, 5 Aug 1996 08:23:29 -0500 (CDT)
Received: from ppp169.n2.net (ppp169.n2.net [204.250.22.169]) by ravel.n2.net (8.6.12/8.6.12) with SMTP id GAA04174 for <hfsig@tapr.org>; Mon, 5 Aug 1996 06:23:28 -0700
Date: Mon, 5 Aug 1996 06:23:28 -0700
Message-Id: <199608051323.GAA04174@rael.n2.net>
X-Sender: k6sti@mail.n2.net

X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: k6sti@n2.net (Brian Beezley)
Subject: Re: [HFSIG:1434] HF SS Demonstration

>> I'd suggest using a noiselike waveform rather than one with spectral
lines >> to make it audibly less intrusive.
>
>Tried this, but this form of partical spread does not appear to make the
>sound any more acceptable, or more difficult to hear. My tests were 10mW
>to 1 Watt, and resulted in significant interference.
>
>Rob

Odd. I find stations tuning up--even weak heterodynes--a lot more annoying
than SSB splatter or the occasional solar noise burst. The San Diego county
noise ordinance lowers the one-hour average SPL noise limit by 5 dB if the
noise contains a steady, audible tone "such as a whine, screech, or hum."

Brian Beezley, K6STI
k6sti@n2.net

From choffman@pelican.davlin.net Mon Aug 05 09:19:18 1996
Received: from pelican.davlin.net (root@pelican.davlin.net [206.245.221.3]) by
tapr.org (8.7.5/8.7.3/1.9) with SMTP id JAA15564 for <hfsig@tapr.org>; Mon, 5 Aug
1996 09:19:16 -0500 (CDT)
Received: from davlin.davlin.net (cc-dup-58.davlin.net [206.245.221.58]) by
pelican.davlin.net (8.6.12/8.6.9) with SMTP id JAA04629 for <hfsig@tapr.org>; Mon,
5 Aug 1996 09:28:38 -0500
Message-ID: <3206026C.111F@pelican.davlin.net>
Date: Mon, 05 Aug 1996 09:17:16 -0500
From: Charles Hoffman <choffman@pelican.davlin.net>
Reply-To: choffman@pelican.davlin.net
Organization: K5SBU
X-Mailer: Mozilla 3.0b5aGold (Win95; I)
MIME-Version: 1.0
To: hfsig@tapr.org
Subject: Re: [HFSIG:1433] Military SS systems
References: <H0000292022b01a5@MHS>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Robert.Glassey@nmp.nokia.com wrote:
>

> Rik K5SBU wrote:
>
> > My amateur radio station is situated on a ranch in South Texas eight

> > miles directly off the backside of the recently installed "over the
> > horizon radar" (OHR) built by Raytheon.

> These are very interesting results. Is your station behind the LPAs?

Yes, eight miles.

> Do they ever point in your direction?

No, the array is composed of a total of 26 separate LPA's in vertical configuration, each suspended between towers, and parallel with the next one. The entire antenna array looks from a distance to be about 50 meters by 200 meters perhaps. (A major highway passes about a mile from it) and that is placed on an enormous ground screen observed during installation. The point is that it is not movable. It is steered, according to Raytheon, by phasing to the various individual LPA elements in the array. No moving parts, that is.

> Have you attempted (out of interest) to measure interference in front of the LPA's say at a mile or two?

No I haven't, but it could be done from that highway mentioned above, which passes right in front of the array a mile or so in front of it. It is interesting to note, that the newspaper indicated that this OHR system was to be used to observe the Caribbean area. A line drawn on a map from the array to the Caribbean passes directly over the FCC Primary Monitoring Station (KI) eight miles away. The monitoring station recently closed, but for unrelated reasons.

If you are interested, I do have a recording of one of the transmissions from the OHR which I made while Raytheon was testing it. Should anyone be interested it could be made into a wave file and uploaded. I posted inquiries to the Brit's radio newsgroup wondering if their signals could be heard on the ham bands there but no one commented.

In conclusion, it should be noted that aside from likely computer controllers of this system, it is not particularly new technology. OHR has been around awhile. Considering that, it could be that someone at Raytheon, the designer and builder, might be willing to contribute something of interest to this group.

> Do the LPAs point away from built up areas?

Aside from the highway traffic passing by in front of the array there are no built up areas in the immediate vicinity. It is wide open Texas ranching country. I would say that all of the signal passes over the King Ranch pastures.

>

> So how do the military do it? Are they really using kilowatts of power? How short are their bursts?

I doubt if those questions would be answered, but considerable power is available with the typical Harris transmitters. Yes kilowatts.

>

> It would be very interesting to get a wide band receiver (4-30MHz) with
> a fast envelope detector, and very fast peak hold and bring it close to
> the SS instalation in Texas. Surely this would make the TX power
> detectable, allowing comparisons with other TX sources, and giving an
> idea of how the signal is spread.
>
> I expect the military have spent millions on reducing interference (Low
> probability of detection) and they use extreemly wide bandwidths. A
> radar may well have quite different characteristics compared to a
> communications system.
>
> I expect most of their techniques are classified, but there must be
> something we can learn from them. From my tests a simple hopping 2ms
> burst is unacceptable. How do they do it??
>
> My tests suggest that a DSSS system with 10 microwatts power in 2.4kHz
> (100mW in 24MHz) would be detectable at 3 miles. A 10mW carrier 2.4kHz
> SNR is about 0dB (still audible above the noise) at 3 miles using a 70cm
> long unmatched whip antenna - shown to be at least 30dB less sensitive
> than a reasonable amateur station in the presence of ambient noise.
>
> Cheers,
>
> Rob, G0VTQ

From Robert.Glassey@nmp.nokia.com Mon Aug 05 10:05:08 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id KAA17980 for <hfsig@tapr.org>; Mon, 5 Aug 1996
10:05:06 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by
noknic.nokia.com (8.6.9/8.6.9) with ESMTP id SAA12251 for <hfsig@tapr.org>; Mon, 5
Aug 1996 18:04:33 +0300

Received: from by samail01.nmp.nokia.com with SMTP

(1.37.109.16/16.2) id AA207217257; Mon, 5 Aug 1996 18:00:58 +0300

X-Openmail-Hops: 2

Date: Mon, 5 Aug 96 16:01:39 +0100

Message-Id: <H0000292022c0ae2@MHS>

In-Reply-To: <199608050526.WAA01021@unix.ka9q.ampr.org>

Subject: [HFSIG:1429] Re: SS on HF bands

Sender: Robert.Glassey@nmp.nokia.com

To: hfsig@tapr.org

> I guess it boils down to what you think ham radio is all
> about. Reliable communications? That description hardly fits direct
> long-haul HF. Easily accessible to those without large lots, liberal
> housing covenants and money for big antennas and power amplifiers? I
> think not. The popularity of VHF/FM and repeater networks shows there
> are a lot of hams who are interested primarily in reliable local
> communications with small stations, and who aren't purists when it
> comes to using relays.

Very true, but then their operation does not lessen the operation or

experimentation of others. Please remember that experimentation for the purpose of self training is not just for the expert, but also for the beginner who wants to build a home brew QRP rig, or get a simple RTTY hack going, or play around with antennas and station configurations to achieve the best possible propagation under difficult conditions. The beginner is not up to the level of high efficiency systems, he is more concerned with the effects of SWR on his transmission line, and why his low vertical performs better than his low dipole, and how much better a quad might be and how they work. Trying to work 100 countries is a great incentive to try and understand these things. This is valid experimentation, and contributes to the understanding of radio techniques amongst people who are not 'rocket scientists'. By all means the experts should challenge the new frontiers, but not by treading on the other folks who have less ambitious aims.

Some have criticized traditional narrow band operators, claiming that they consider the whole band to be theirs, but really they only occasionally claim a few kHz, without upsetting anyone else. They see a few SS zealots as attempting to hijack the *entire* band as their own, causing interference and lessening the enjoyment of everyone else.

> where we trail the commercial and military world. While I don't really
> have anything against DXing and contesting, I really don't see how
> they help justify ham radio's existence to the outside world; they're
> really little more than technological stamp-collecting.

see above.

> And whatever risks there are will be worth the benefits. After all,

Who's cost, who's benefit. Not everyone thinks SS is the 'one true mode', or needs its efficiency. Others have other interests.

By all means experiment but not to the detriment of others, it's not your band either. As they say, 'Fools rush in...' and all that. We can start on a much smaller scale. This is not an ideal world, only the real one.

My weekend experiments have convinced me that I would not like an SS operator hopping over the entire 20m band, running more than 100 microwatts within 5 miles of my QTH.

Rob.

From Robert.Glassey@nmp.nokia.com Mon Aug 05 10:51:41 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id KAA19904 for <hfsig@tapr.org>; Mon, 5 Aug 1996 10:51:39 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id SAA15518 for <hfsig@tapr.org>; Mon, 5 Aug 1996 18:49:53 +0300

Received: from by samail01.nmp.nokia.com with SMTP

(1.37.109.16/16.2) id AA230869973; Mon, 5 Aug 1996 18:46:13 +0300

X-Openmail-Hops: 2
Date: Mon, 5 Aug 96 16:46:43 +0100
Message-Id: <H0000292022c4002@MHS>
In-Reply-To: <199608051323.GAA04174@ravel.n2.net>
Subject: [HFSIG:1436] Re: HF SS Demonstration
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

> Odd. I find stations tuning up--even weak heterodynes--a lot more
> annoying than SSB splatter or the occasional solar noise burst. The
> San Diego county noise ordinance lowers the one-hour average SPL noise
> limit by 5 dB if the noise contains a steady, audible tone "such as a
> whine, screech, or hum."

Yeah, I know what you mean. I tried a 2ms burst, 10ms burst and a steady carrier. The steady carrier was easily the most audible, and the 10ms burst was worse than the 2ms burst. Compared to the 2ms burst the noise burst (30ms) was more annoying.

Cheers,

Rob

From sivula@NCSNRS01ES.ntc.nokia.com Mon Aug 05 12:28:53 1996
Received: from axl01it.ntc.nokia.com (axl01it.ntc.nokia.com [131.228.118.232]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id MAA23777 for <hfsig@tapr.org>; Mon, 5 Aug 1996 12:28:49 -0500 (CDT)
Received: from ntcit-mmta6.ntc.nokia.com (ntcit-mmta6.ntc.nokia.com [131.228.118.49]) by axl01it.ntc.nokia.com (8.6.9/8.6.9) with ESMTP id NAA09402 for <hfsig@tapr.org>; Mon, 5 Aug 1996 13:56:51 +0300
Received: from Microsoft Mail (PU Serial #1604)
by ntcit-mmta6.ntc.nokia.com (PostalUnion/SMTP(tm) v2.1.8d for Windows NT(tm))
id AA-1996Aug05.120248.1604.258127; Mon, 05 Aug 1996 13:56:51 +0300
From: sivula@NCSNRS01ES.ntc.nokia.com (Sivula Timo (NTC/Espoo))
To: hfsig@tapr.org (hfsig)
Message-ID: <1996Aug05.120248.1604.258127@ntcit-mmta6.ntc.nokia.com>
X-Mailer: Microsoft Mail via PostalUnion/SMTP for Windows NT
Mime-Version: 1.0
Content-Type: text/plain; charset="ISO-8859-1"
Organization: Nokia Telecommunications
Date: Mon, 05 Aug 1996 13:56:51 +0300
Subject: Re: Amateur culture

Phil writes:

>Indeed, ham radio doesn't exist in a vacuum. It is not just a hobby.
>It is given spectrum that could otherwise be sold for big bucks
>because it supposedly gives something back to society as a whole. Now
>that emergency communications and international good will have largely
>been taken over by cellular telephones and the Internet, respectively,
>what's left?

Well, what about its educational influence? I do not know whether this applies internationally, please advice me, but in Finland the amateur hobby has very often lead starting technical studies. In this way I think that society has got something back from the giving away of spectrum. I do not think it is a coincidence that many of our colleagues are hams. The hobby is of course just one of the reasons. Anyway there is a correlation between spectrum allocated for amateurs and the amount of radio engineers, I think.

An other area where society has gained from the hobby is in defence. In small countries that cannot afford an expensive professional army, self educated troops are very valuable. Very often Radio Amateurs only need little extra training for becoming good military radio operators and radio officers.

>Technical experimentation and self-training! How much of that
>really goes on in ham radio these days? Not much

I would like to disagree on this point, as well. There is a lot of self training and experimenting going on, on the individual level. A normal HF SSB QSO from Finland to the USA requires a lot of know how. Everything is of course well documented and existing old information, but for the unexperienced individual newcomer HAM this qso is extremely self educating and it is experimental for him/her, as a person. For me, the assembling of my 7 MHz QRP XTAL CW rig, a few years ago, was self educating and experimental. As is now the testing and writing of code for the DSP4

IMHO we should not restrict the evaluation of the amateur radio hobby to the absolute edge of development only. Other areas can be valuable for the society, as well.

ObHFsig: Is there anybody in the US or outside Europe that would be interested in testing SP9VRC's modem software in a QSO to Finland? The software run on a motorola EVM or an Alef Null DSP4. I would be interested in testing the slow BPSK modem and the faster DQPSK modems in a DX QSO. Required HW is a HF capable amateur station and an EVM or DSP4 and a PC.

Has anybody any experience of writing a computer control code for the Yaesu

FT 757 GX?

My code for the DSP4 most probably would gain from hearing some experience from others...

Timo, OH6KK & OH2LVZ

Timo.Sivula@ntc.nokia.com

From alanb@polecat.sr.hp.com Mon Aug 05 14:01:13 1996

Received: from relay.hp.com (relay.hp.com [15.255.152.2]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id OAA26846 for <hfsig@tapr.org>; Mon, 5 Aug 1996 14:01:11 -0500 (CDT)

Received: from srmail.sr.hp.com by relay.hp.com with ESMTP

(1.37.109.16/15.5+ECS 3.3) id AA073551667; Mon, 5 Aug 1996 12:01:08 -0700

Received: from polecat.sr.hp.com (algae.sr.hp.com) by srmail.sr.hp.com with ESMTP

(1.37.109.16/15.5+ECS 3.3) id AA069491594; Mon, 5 Aug 1996 11:59:55 -0700

Received: by polecat.sr.hp.com

(1.37.109.16/15.5+ECS 3.3) id AA259141593; Mon, 5 Aug 1996 11:59:53 -0700

From: Alan Bloom <alanb@polecat.sr.hp.com>

Message-Id: <199608051859.AA259141593@polecat.sr.hp.com>

Subject: SS on HF

To: hfsig@tapr.org

Date: Mon, 5 Aug 1996 11:59:53 -0800 (PDT)

X-Mailer: ELM [version 2.4 PL21]

Mime-Version: 1.0

Content-Type: text/plain; charset=US-ASCII

Content-Transfer-Encoding: 7bit

Phil Karn <karn@unix.ka9q.ampr.org> wrote:

>I agree, and actually that's why I would support dividing up the band
>into "DX" and "regional" subbands to mitigate the near-far problem.
>Each subband would still allow wideband modulation within it, but only
>for the right purpose (i.e., DX or local). I think this would go a
>long way towards solving the problem, don't you?

No. There is no way to separate local from DX stations on HF. Local stations in the "local" band will be drowned out by other "local" stations thousands of miles away. And DX stations in the "DX" band will be munged by other DX stations (some close by and some far away).

>... If everyone's power is matched at the receiver, you can tolerate as
>many as 31.6 other users before their aggregate interference brings
>the Eb/N0 down to 6 dB. ...

To assume that everyone's power is the same is a reasonable first approximation for a VHF cellular system (give or take 10 dB or so). But on the HF bands, there are huge differences between signal levels. It would be rare to be working a station that is within 10 dB or so of the strongest signal on the band.

>>Spread spectrum works fine for something like a cellular telephone system
>>where the locations and power levels of all stations are well-controlled.

>>But on the amateur bands, stations are randomly distributed.

>

>Most cellular users are randomly distributed too. But they do generally
>talk only to the nearest base station.

You obviously know much more about cellular communications than I do,
but as I understand it:

Since uplink and downlink frequencies are separated by 45 MHz, the mobile
stations will not interfere with each other. Since the mobile stations'
power is controlled by the base stations, mobile stations don't interfere
with base stations. And since mobile stations always talk to the closest
base station, base stations don't interfere with mobile stations.

In all cases, interfering signals are never very much stronger than the
desired signals. A cellular system is a carefully-designed system with
tight controls on location and power levels of transmitters. It also
depends on repeatable propagation characteristics. None of those
conditions exist on the HF amateur bands.

>This is true as far as it goes, but 100 dB adjacent channel rejection
>seems a little generous. 60 dB is a more reasonable estimate, I think.
>Whatever.

Good HF communications receivers these days can have 130 dB or more of
blocking dynamic range for interfering signals 20 kHz away. "Adjacent
channel rejection" (3 kHz away?) would be less than that, but 100 dB
seems a pretty conservative typical number. A receiver with only
60 dB of dynamic range would be horrible.

>>Cellular-style communications doesn't work on DX bands, because
>>nearby stations are typically very much weaker than distant stations.
>>(Because ground wave propagation is much lossier than sky wave.)
>
>Ah, but wouldn't this tend to mitigate the near-far problem?

It's not a "near-far" problem so much as a "strong-weak" problem.
On HF, the strongest stations are rarely the closest ones. At a given
time, a station in Tokyo can easily be 60 dB louder than a similar
station in Denver.

>... That means keeping up with the state of the art in the
>non-amateur world, and spread spectrum is certainly one technology
>where we trail the commercial and military world.

I agree with that. But we need to be sure we don't apply commercial
technology inappropriately. To some extent, that's what happened with
AX.25 packet radio. We took a system that was designed for wire LANs
and adopted it with few changes for radio. It works, but not as well
as it should.

AL N1AL

From wd5ivd@tapr.org Mon Aug 05 15:33:51 1996
Received: (from wd5ivd@localhost) by tapr.org (8.7.5/8.7.3/1.9) id PAA01229 for hfsig@tapr.org; Mon, 5 Aug 1996 15:33:50 -0500 (CDT)
From: Greg Jones <wd5ivd@tapr.org>
Message-Id: <199608052033.PAA01229@tapr.org>
Subject: Re: [HFSIG:1438] Re: SS on HF bands
To: hfsig@tapr.org
Date: Mon, 5 Aug 1996 15:33:50 -0500 (CDT)
In-Reply-To: <H0000292022c0ae2@MHS> from "Robert.Glassey@nmp.nokia.com" at Aug 5, 96 10:12:15 am
X-Mailer: ELM [version 2.4 PL25]
Content-Type: text

>

> My weekend experiments have convinced me that I would not like an SS
> operator hopping over the entire 20m band, running more than 100
> microwatts within 5 miles of my QTH.
>

Hello.

I don't think you should make a choice between 'good' or 'bad' based on your overly simplistic and not very scientific experiment.

Doing these types of analogy testing is good and can help people understand what is at work here -- but there are certain standards required when doing these types of testing to give them high trustworthiness and creditability.

Cheers - Greg, WD5IVD

From wd6ehr@kaiwan009.kaiwan.com Mon Aug 05 16:15:17 1996
Received: from kaiwan009.kaiwan.com (kaiwan009.kaiwan.com [198.178.203.9]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id QAA02458 for <hfsig@tapr.org>; Mon, 5 Aug 1996 16:15:16 -0500 (CDT)
Received: (from wd6ehr@localhost) by kaiwan009.kaiwan.com (8.7.3/8.7.3) id OAA24677 for hfsig@tapr.org; Mon, 5 Aug 1996 14:15:11 -0700 (PDT)

*** KAIWAN Internet ***

From: Mike Curtis <wd6ehr@kaiwan009.kaiwan.com>
Message-Id: <199608052115.OAA24677@kaiwan009.kaiwan.com>
Subject: Re: [HFSIG:1440] Re: Amateur culture
To: hfsig@tapr.org
Date: Mon, 5 Aug 1996 14:15:10 -0700 (PDT)
In-Reply-To: <1996Aug05.120248.1604.258127@ntcit-mmta6.ntc.nokia.com> from "Sivula Timo (NTC/Espoo)" at Aug 5, 96 12:44:54 pm
X-Mailer: ELM [version 2.4 PL22]
MIME-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

> Well, what about <amateur radios> educational influence?

I can't speak about other countries, but in the USA, you only have to memorize test answers to get a license. Unfortunately, that's precisely what MOST new (and upgrading) amateurs do. Amateur radio here is generally not educational - it has been reduced to nothing more than a test of short term memory.

But in any case, education is not part of our rules here, FCC rules part 97. Advancing the state of the art and other technical aspects are the main reasons given for our existence. "International goodwill" and "Trained radio operators" are mentioned once each, out of the 5 reasons given.

-- mike

From karn@qualcomm.com Mon Aug 05 17:40:20 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id RAA06140 for <hfsig@tapr.org>; Mon, 5 Aug 1996 17:40:18 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id PAA29230; Mon, 5 Aug 1996 15:39:46 -0700 (PDT)
Date: Mon, 5 Aug 1996 15:39:46 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608052239.PAA29230@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <199608052033.PAA01229@tapr.org> (message from Greg Jones on Mon, 5 Aug 1996 15:35:28 -0500 (CDT))
Subject: Re: [HFSIG:1442] Re: SS on HF bands

Greg,

Actually, I think Robert's experiments are a good start. You may quibble with the details of the experiments, but it's hard to argue that at least trying some actual tests can't add some light to the heat of the discussion. They should be encouraged. And I thought simulating just a narrowband "piece" of the spread spectrum signal was a clever idea.

The one comment I have to Robert is this: yes, you may have been able to detect your signals given that you knew they were there and you were specifically looking for them. But being able to simply detect the simulated SS signal (especially on a quiet band) is not the same as saying they'd interfere with your ability to communicate under typical conditions. Would you have been able to detect them had there been a typical SSB signal on the channel in question, and if you had would it have caused any appreciable interference? That's the real issue here.

Phil

From wd5ivd@tapr.org Mon Aug 05 18:18:46 1996
Received: (from wd5ivd@localhost) by tapr.org (8.7.5/8.7.3/1.9) id SAA08883 for

hfsig@tapr.org; Mon, 5 Aug 1996 18:18:45 -0500 (CDT)
From: Greg Jones <wd5ivd@tapr.org>
Message-Id: <199608052318.SAA08883@tapr.org>
Subject: Re: [HFSIG:1444] Re: SS on HF bands
To: hfsig@tapr.org
Date: Mon, 5 Aug 1996 18:18:44 -0500 (CDT)
In-Reply-To: <199608052239.PAA29230@servo.qualcomm.com> from "Phil Karn" at Aug 5, 96 05:40:32 pm
X-Mailer: ELM [version 2.4 PL25]
Content-Type: text

I wasn't trying discourage such work -- that just making a judgement to the mode as being good or bad based off of one small test is not correct.

There is more involved, as you point out below, to the entire process.

I hope we can continue to foster such work and development, but not make judgements based on first impressions.

Cheers - Greg

>
> Greg,
>
> Actually, I think Robert's experiments are a good start. You may
> quibble with the details of the experiments, but it's hard to argue
> that at least trying some actual tests can't add some light to the
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> been a typical SSB signal on the channel in question, and if you had
> would it have caused any appreciable interference? That's the real
> issue here.
>
> Phil
>
>

From jbbloom@connix.com Mon Aug 05 18:27:56 1996
Received: from comet.connix.com (comet.connix.com [198.69.10.4]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id SAA09300 for <hfsig@tapr.org>; Mon, 5 Aug 1996 18:27:54 -0500 (CDT)
Received: from jbbloom.connix.com (jbbloom.connix.com [205.246.105.188]) by comet.connix.com (8.6.5/8.6.5) with SMTP id TAA22422 for <hfsig@tapr.org>; Mon, 5 Aug 1996 19:27:52 -0400
Received: by jbbloom.connix.com with Microsoft Mail

id <01BB8304.4FA5E2C0@jbbloom.connix.com>; Mon, 5 Aug 1996 19:28:42 -0400
Message-ID: <01BB8304.4FA5E2C0@jbbloom.connix.com>
From: Jon Bloom <jbbloom@connix.com>
To: "'hfsig@tapr.org'" <hfsig@tapr.org>
Subject: RE: [HFSIG:1443] Re: Amateur culture
Date: Mon, 5 Aug 1996 19:28:37 -0400
MIME-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Content-Transfer-Encoding: 7bit

Mike Curtis[SMTP:wd6ehr@kaiwan009.kaiwan.com] wrote:

>
>> Well, what about <amateur radios> educational influence?
>
>
>I can't speak about other countries, but in the USA, you only have to
>memorize test answers to get a license. Unfortunately, that's precisely
>what MOST new (and upgrading) amateurs do. Amateur radio here is generally
>not educational - it has been reduced to nothing more than a test of short
>term memory.

The educational aspects of Amateur Radio need not, and do not, end with the taking of the test. The license requirements exist to set minimum standards that ensure (in theory) that the licensee can safely and properly operate a station. Period. (Whether the current exams meet that goal is a subject best left to a forum other than HFSIG.) I suspect that most amateurs learn far more after getting licensed than they did to *get* licensed. I know I did.

I should also add that Amateur Radio is used as an adjunct to formal educational curricula in many schools. Its role in education is not limited to self-training.

>But in any case, education is not part of our rules here, FCC rules part 97.
>Advancing the state of the art and other technical aspects are the main
>reasons given for our existence. "International goodwill" and "Trained
>radio operators" are mentioned once each, out of the 5 reasons given.

As is contributing to the advancement of the state of the art. But that's neither here nor there. Nowhere in Part 97.1 is priority given to any of the reasons cited. Amateur Radio's role as a voluntary noncommercial communication service is no lesser a part of 97.1 than its role in contributing to the state of the art. And if the 97.1 paragraphs that refer to "advancing skills in both the communications and technical phases of the art" and "expansion of... trained operators, technicians, and electronics experts" don't make education part of our rules, what would?

In addition to which, we would be foolish indeed to put all of our eggs in one basket, so to speak. Fulfilling a number of roles gives a much stronger case than relying on one--or one "main"--role as a rationale for our existence.

As it applies to the current HFSIG discussions, I think that part of our educational process should include investigating new techniques and technologies. On that basis, I'd love to see some exploration of SS techniques on HF. But since nowhere in Part 97 is the rationale for Amateur Radio stated as the development of a maximally efficient communication system, it's not a given--at least to me--that we should abandon all narrowband activity in favor of an SS system even if such a system can be shown to be more spectrum-efficient in theory and practice. Which means that any SS system must coexist with narrowband uses of the spectrum by whatever means make that possible.

-- Jon

From lay@cod.nosc.mil Mon Aug 05 18:30:21 1996
Received: from trout.nosc.mil (trout.nosc.mil [128.49.16.7]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id SAA09367 for <hfsig@tapr.org>; Mon, 5 Aug 1996 18:30:17 -0500 (CDT)
Received: from marlin.nosc.mil by trout.nosc.mil (4.1/SMI-4.1) id AA19941; Mon, 5 Aug 96 16:30:05 PDT
Received: from sam.nosc.mil by marlin.nosc.mil (4.1/SMI-4.1) id AA27592; Mon, 5 Aug 96 16:30:03 PDT
Date: Mon, 5 Aug 96 16:30:03 PDT
Message-Id: <9608052330.AA27592@marlin.nosc.mil>
X-Sender: lay@cod.nosc.mil
X-Mailer: Windows Eudora Pro Version 2.1.2
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: Richard Lay <lay@cod.nosc.mil>
Subject: Probability question

This question has to do with HF ALE radios and their link establishment protocol. One radio sends out a sequence of ALE words. If the receiver finds these words 'appropriate' or 'correct' from its point of view, it will reply, etc. and the link is established. If the receiver detects so many 'inappropriate' or 'incorrect' or 'bad' ALE words in a row, it will disestablish the link and continue scanning. Now, if the probability that one received ALE word is incorrect is $= P$, and the sequence of ALE words is S long, then what is the probability that at least Y words in a row are incorrect? It's the "at least" and "in a row" that are giving me trouble!

Rich

From k6sti@n2.net Mon Aug 05 19:35:58 1996
Received: from ravel.n2.net (rael.n2.net [204.250.22.20]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id TAA12433 for <hfsig@tapr.org>; Mon, 5 Aug 1996 19:35:56 -0500 (CDT)
Received: from ppp169.n2.net (ppp169.n2.net [204.250.22.169]) by ravel.n2.net (8.6.12/8.6.12) with SMTP id RAA13794 for <hfsig@tapr.org>; Mon, 5 Aug 1996 17:35:57 -0700
Date: Mon, 5 Aug 1996 17:35:57 -0700
Message-Id: <199608060035.RAA13794@rael.n2.net>
X-Sender: k6sti@mail.n2.net

X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: hfsig@tapr.org
From: k6sti@n2.net (Brian Beezley)
Subject: How much QRM is too much?

>The one comment I have to Robert is this: yes, you may have been able
>to detect your signals given that you knew they were there and you
>were specifically looking for them. But being able to simply detect
>the simulated SS signal (especially on a quiet band) is not the same
>as saying they'd interfere with your ability to communicate under
>typical conditions. Would you have been able to detect them had there
>been a typical SSB signal on the channel in question, and if you had
>would it have caused any appreciable interference? That's the real
>issue here.

For someone trying to copy a signal right at the thermal, cosmic, or atmospheric noise level, any interference is appreciable. For some hams (particularly 160m, 6m, and VHF/UHF weak-signal types but also for some HF DXers and QRPers), trying to make two-way contact with extremely weak signals constitutes a large part of their amateur activities. These people will never welcome power that could have been put elsewhere, even if it raises their noise floor only by a dB or two. An EMEer can turn blue at the thought of losing of a few tenths of a dB!

Brian Beezley, K6STI
k6sti@n2.net

From k5yfw@www.kelly-afb.org Mon Aug 05 21:21:02 1996
Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id VAA16960 for <hfsig@tapr.org>; Mon, 5 Aug 1996 21:21:00 -0500 (CDT)
Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id VAA11427 for hfsig@tapr.org; Mon, 5 Aug 1996 21:21:40 -0500 (CDT)
From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
Message-Id: <199608060221.VAA11427@www.kelly-afb.org>
Subject: Re: [HFSIG:1447] Probability question
To: hfsig@tapr.org
Date: Mon, 5 Aug 1996 21:21:39 -0500 (CDT)
In-Reply-To: <9608052330.AA27592@marlin.nosc.mil> from "Richard Lay" at Aug 5, 96 06:43:33 pm
Reply-To: k5yfw@www.kelly-afb.org
X-Mailer: ELM [version 2.4 PL24]
Content-Type: text

Rich,

If you really want the Mil-Std protocol I can get it but I think you are

basically correct. There are a couple things that makes ALE not really desirable for hams...one is that the query transmitter transmits a _long_ (very long) series of "words" at a very low baud rate...its called "order wire". The length is long enough for the desitnation/desired receiver to scan _all_ the channels in the ALE program. If the "network" has 8-12 channles the scan time for the Mil-Std ALC could be over a minute...this means that the quesry transmitter would transmit for over a minute. Talk about QRM...and to make matters worse, the Mil-Std ALE protocol doesn't listen on a channel before it transmits...if you have an established communication (QSO) going on, it will walk right on top of you. We disabled it in Saudi during the Gulf War ('90-'91) in favor of doing a daily propagation study using Minimuf...this worked better.

The Mil-Std and Fed-Std have been pushed by several hams thru the ARRL and there was even an big article in QST a couple of years ago.

73, Walt

In your message you write:

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> This question has to do with HF ALE radios and their link establishment
> protocol. One radio sends out a sequence of ALE words. If the receiver
> finds these words 'appropriate' or 'correct' from its point of view, it will
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> one received ALE word is incorrect is = P, and the sequence of ALE words is
> S long, then what is the probability that _at least_ Y words _in a row_ are
> incorrect? It's the "at least" and "in a row" that are giving me trouble!
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> Rich
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--

```
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| The MicroSoft operating system didn't get as bad as it is overnight,|
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|                               | The greatest dangers to liberty |
| Walt DuBose - K5YFW          | lurk in insidious encroachment |
| E-Mail k5yfw@www.kelly-afb.org | by men of zeal, well-meaning |
| Business Telephone: (210)925-6081 | but without understanding.   |
|   Home Telephone: (210)696-3196 |                               |
|                               | - Justice Louis D. Brandeis |
|                               |                               |
=====
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From k5yfw@www.kelly-afb.org Mon Aug 05 21:41:45 1996

Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org

(8.7.5/8.7.3/1.9) with ESMTP id VAA17557 for <hfsig@tapr.org>; Mon, 5 Aug 1996 21:41:43 -0500 (CDT)
Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id VAA11463 for hfsig@tapr.org; Mon, 5 Aug 1996 21:42:23 -0500 (CDT)
From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
Message-Id: <199608060242.VAA11463@www.kelly-afb.org>
Subject: Re: [HFSIG:1446] Re: Amateur culture
To: hfsig@tapr.org
Date: Mon, 5 Aug 1996 21:42:23 -0500 (CDT)
In-Reply-To: <01BB8304.4FA5E2C0@jbbloom.connix.com> from "Jon Bloom" at Aug 5, 96 06:43:00 pm
Reply-To: k5yfw@www.kelly-afb.org
X-Mailer: ELM [version 2.4 PL24]
Content-Type: text

Jon, et al,

I've remained silent too long on this subject.

I have to agree that most hams do most certainly learn more after they receive their "first" license. Few folks in the U.S. go directly from being un-licensed to Extra Class. When a ham stops learning, they should turn in their license.

There is a ham, and perhaps on this SIG, but known to the ARRL Educational folks (Jon ask Rosalie) who got a big bucks job a with a cellphone company because of his hands-on "radio" experience through hamradio...even tho his had not finished his degree...others applying for the job had degrees, post-grad. degrees, but no hands-on experience. Our hambands are becoming the only available frequencies that educational institutions can readily use for experimentation...so all you teachers, Middle school thru post grad. get a ham ticket.

I am on the Board of Directors of the Young Astronaut Technology Program in the Northeast School district here in San Antonio and we use ham radio as a teaching tool.

One other point. Many of us here in San Antonio have had the oppertunity to "take back" event communications from trunking radios and/or cellphones. The individual with the radio 1) may not be trained and does a bad job of communiting 2) doesn't listen to the radio 3) Is too busy taking care of event business to mess with the radio. Our radio operators are the VIPs ears and voice. Ah ha, now I remember why in WWII and the Korean Conflict we had radio operators...and radio operators on ships and aeroplanes...the NCOIC Officer, Captain, pilot is too busy making decisions to listen to the radio. Also, cellphones don't talk to a whole bunch of persons all at once.

73, Walt

In your message you write:

>

> Mike Curtis[SMTP:wd6ehr@kaiwan009.kaiwan.com] wrote:

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> >
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> practice. Which means that any SS system must coexist with narrowband
> uses of the spectrum by whatever means make that possible.
>

> -- Jon
>
>

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| it has taken over 10 years of careful, calculated development.      |
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```

|                               |
|                               | The greatest dangers to liberty |
| Walt DuBose - K5YFW          | lurk in insidious encroachment |
| E-Mail k5yfw@www.kelly-afb.org | by men of zeal, well-meaning  |
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|   Home Telephone: (210)696-3196 |                               |
|                               | - Justice Louis D. Brandeis  |
|                               |                               |
=====
```

From choffman@pelican.davlin.net Mon Aug 05 21:59:23 1996

Received: from pelican.davlin.net (root@pelican.davlin.net [206.245.221.3]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id VAA18061 for <hfsig@tapr.org>; Mon, 5 Aug 1996 21:59:21 -0500 (CDT)

Received: from davlin.davlin.net (cc-dup-60.davlin.net [206.245.221.60]) by pelican.davlin.net (8.6.12/8.6.9) with SMTP id WAA10757 for <hfsig@tapr.org>; Mon, 5 Aug 1996 22:08:44 -0500

Message-ID: <3206B492.2E70@pelican.davlin.net>

Date: Mon, 05 Aug 1996 21:57:22 -0500

From: Charles Hoffman <choffman@pelican.davlin.net>

Reply-To: choffman@pelican.davlin.net

Organization: K5SBU

X-Mailer: Mozilla 3.0b5aGold (Win95; I)

MIME-Version: 1.0

To: hfsig@tapr.org

Subject: Re: [HFSIG:1442] Re: SS on HF bands

References: <199608052033.PAA01229@tapr.org>

Content-Type: text/plain; charset=us-ascii

Content-Transfer-Encoding: 7bit

Gentlemen, please! May I make an humble and polite suggestion? After some 37 years of observations of amateur radio, military and commercial technological pioneering, and as a former university professor responsible for raising the awareness of my students-in-earnest, like yourselves, please permit me to suggest that it is always important to do your research. See what has already been done. Experiments with interference is history, check your technical library, do your homework so to speak and beyond all, do not invent with a thesaurus in your left hand. All good ideas, but everything I have read here for some time has already been done. Ask the questions and get the answers, then go from there. SS is over twenty years here, eh? Perhaps you might check with W3X0 and some of the much earlier pioneers in SS to see what they have become bored with. HO HO!

Everyones efforts are recognized and appreciated greatly, believe me, and I am speaking for myself, but I am reading great ideas (seriously) but which have already been invented. Read your resources and save your greatest creativity for that which has not yet been tried, concluded; focus, based upon not what has already been done, but amplify from there with your refreshing creations of cogitation.

This is meant to be complimentary, but I am becoming somewhat frustrated with the thread (perhaps, "been there done that", will mean something in the popular vernacular--no offense intended 8-o). Please carry on gentlemen, you have my undivided attention. We are all one anothers teachers; I do hope my decades of experience is somehow beneficial as we are indeed all on the same tangent here. WEll done to all.

73 Rik de K5SBU

Greg Jones wrote:

>
> >
> > My weekend experiments have convinced me that I would not like an SS
> > operator hopping over the entire 20m band, running more than 100
> > microwatts within 5 miles of my QTH.
> >
>
> Hello.
>
> I don't think you should make a choice between 'good' or 'bad' based on your
> overly simplistic and not very scientific experiment.
>
> Doing these types of analogy testing is good and can help people understand
> what is at work here -- but there are certain standards required when doing
> these types of testing to give them high trustworthiness and creditability.
>
> Cheers - Greg, WD5IVD

From choffman@pelican.davlin.net Mon Aug 05 22:59:44 1996

Received: from pelican.davlin.net (root@pelican.davlin.net [206.245.221.3]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id WAA20531 for <hfsig@tapr.org>; Mon, 5 Aug 1996 22:59:37 -0500 (CDT)

Received: from davlin.davlin.net (cc-dup-60.davlin.net [206.245.221.60]) by pelican.davlin.net (8.6.12/8.6.9) with SMTP id XAA11440 for <hfsig@tapr.org>; Mon, 5 Aug 1996 23:09:01 -0500

Message-ID: <3206C2B4.64C@pelican.davlin.net>

Date: Mon, 05 Aug 1996 22:57:40 -0500

From: Charles Hoffman <choffman@pelican.davlin.net>

Reply-To: choffman@pelican.davlin.net

Organization: K5SBU

X-Mailer: Mozilla 3.0b5aGold (Win95; I)

MIME-Version: 1.0

To: hfsig@tapr.org

Subject: Re: [HFSIG:1449] Re: Probability question

References: <199608060221.VAA11427@www.kelly-afb.org>

Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

100% on this one guys...Walt is on target here; forget about ALE on amrad. First we are not appropriately authorized. Second, the propagation avenues are not appropriate for ALE on the linear harmonic related freqs we have available. This system is designed for total HF access. Lets refocus here.

Walt DuBose - K5YFW wrote:

```
>
> Rich,
>
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> > disestablish the link and continue scanning. Now, if the probability that
> > one received ALE word is incorrect is = P, and the sequence of ALE words is
> > S long, then what is the probability that _at least_ Y words _in a row_ are
> > incorrect? It's the "at least" and "in a row" that are giving me trouble!
> >
> > Rich
> >
> >
> >
> --
> =====
> | The MicroSoft operating system didn't get as bad as it is overnight,|
> | it has taken over 10 years of careful, calculated development.      |
> =====
```

```

> |
> |
> | Walt DuBose - K5YFW
> | E-Mail k5yfw@www.kelly-afb.org
> | Business Telephone: (210)925-6081
> | Home Telephone: (210)696-3196
> |
> | - Justice Louis D. Brandeis
> |
> =====

```

From wd6ehr@kaiwan009.kaiwan.com Tue Aug 06 02:14:44 1996
Received: from kaiwan009.kaiwan.com (kaiwan009.kaiwan.com [198.178.203.9]) by
tapr.org (8.7.5/8.7.3/1.9) with ESMTP id CAA02317 for <hfsig@tapr.org>; Tue, 6 Aug
1996 02:14:43 -0500 (CDT)

Received: (from wd6ehr@localhost) by kaiwan009.kaiwan.com (8.7.3/8.7.3) id
AAA17899 for hfsig@tapr.org; Tue, 6 Aug 1996 00:14:35 -0700 (PDT)

*** KAIWAN Internet ***

From: Mike Curtis <wd6ehr@kaiwan009.kaiwan.com>
Message-Id: <199608060714.AAA17899@kaiwan009.kaiwan.com>
Subject: Re: [HFSIG:1446] Re: Amateur culture
To: hfsig@tapr.org
Date: Tue, 6 Aug 1996 00:14:34 -0700 (PDT)
In-Reply-To: <01BB8304.4FA5E2C0@jbbloom.connix.com> from "Jon Bloom" at Aug 5, 96
06:43:00 pm
X-Mailer: ELM [version 2.4 PL22]
MIME-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

```

>
> Mike Curtis[SMTP:wd6ehr@kaiwan009.kaiwan.com] wrote:
> >
> >> Well, what about <amateur radios> educational influence?
> >
> >
> >I can't speak about other countries, but in the USA, you only have to
> >memorize test answers to get a license. Unfortunately, that's precisely
> >what MOST new (and upgrading) amateurs do. Amateur radio here is generally
> >not educational - it has been reduced to nothing more than a test of short
> >term memory.
>
> The educational aspects of Amateur Radio need not, and do not, end with
> the taking of the test. The license requirements exist to set minimum
> standards that ensure (in theory) that the licensee can safely and
> properly operate a station. Period. (Whether the current exams meet that
> goal is a subject best left to a forum other than HFSIG.) I suspect
> that most amateurs learn far more after getting licensed than they
> did to *get* licensed. I know I did.
>
> I should also add that Amateur Radio is used as an adjunct to formal
> educational curricula in many schools. Its role in education is not
> limited to self-training.

```

I agree that a lot of hams learn more after being licensed than to be licensed. But my points were that 1. to GET the license requires ONLY rote memorization, and 2. unfortunately MOST hams never progress much beyond what is required.

Both of us have taken the lead in education among hams. And there have been (and will be) a lot of hams who are interested in learning what they really should know for the license - and beyond. Unfortunately, many of the ignoramuses who are just interested in appliance operation make things difficult. There used to be a popular repeater here in LA where technical talk was "officially" discouraged. I don't know if it's still "no-tech", or even if it's still on the air, but that's unimportant.

> As it applies to the current HFSIG discussions, I think that part of
> our educational process should include investigating new techniques and
> technologies. On that basis, I'd love to see some exploration of SS
> techniques on HF. But since nowhere in Part 97 is the rationale for
> Amateur Radio stated as the development of a maximally efficient
> communication system, it's not a given--at least to me--that we should
> abandon all narrowband activity in favor of an SS system even if such
> a system can be shown to be more spectrum-efficient in theory and
> practice. Which means that any SS system must coexist with narrowband
> uses of the spectrum by whatever means make that possible.

One of the best things about amateur radio IMHO is its diversity. I think most of us will agree with this wholeheartedly. Nowhere have I seen a proposal to pursue any particular mode to the exclusion of all others. So I don't see abandonment of all narrowband technology as anything to be concerned about.

Over the years, we've had to make adjustments in band usage. When RTTY became more popular, we made room for it. When SSTV came around, we adjusted. Ditto packet, AMTOR, et al. But all the "old" modes are still around (well, except spark, but that's not the fault of anything other than the mode itself :-)

One thing for sure - it's going to be most interesting watching things unfold.

-- mike

From wd5ivd@tapr.org Tue Aug 06 04:12:32 1996
Received: (from wd5ivd@localhost) by tapr.org (8.7.5/8.7.3/1.9) id EAA05283 for hfsig@tapr.org; Tue, 6 Aug 1996 04:12:32 -0500 (CDT)
From: Greg Jones <wd5ivd@tapr.org>
Message-Id: <199608060912.EAA05283@tapr.org>
Subject: EVM56002 ?
To: hfsig@tapr.org (HF SIG mailing)
Date: Tue, 6 Aug 1996 04:12:31 -0500 (CDT)
X-Mailer: ELM [version 2.4 PL25]
Content-Type: text

There is an opportunity for TAPR to do a group purchase on the Motorola EVM56002 at a pretty low cost. Between 20 and 200 units would be the goal...same price no matter how many are purchased. Figure about \$60 under current commercial prices. No hard prices, because more work would have to be done.

Would there be interest in this in the HF SIG ? Especially since Johan's code would run on it.

I have spoken with Johan and he thinks it would be great...what are some other reactions.

Cheers - Greg, WD5IVD

From Robert.Glassey@nmp.nokia.com Tue Aug 06 04:20:47 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id EAA05633; Tue, 6 Aug 1996 04:20:45 -0500 (CDT)
From: Robert.Glassey@nmp.nokia.com
Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id MAA15225; Tue, 6 Aug 1996 12:19:37 +0300
Received: from by samail01.nmp.nokia.com with SMTP (1.37.109.16/16.2) id AA131832959; Tue, 6 Aug 1996 12:15:59 +0300
X-Openmail-Hops: 2
Date: Tue, 6 Aug 96 10:16:32 +0100
Message-Id: <H0000292022d7982@MHS>
In-Reply-To: <199608052033.PAA01229@tapr.org>
Subject: [HFSIG:1442] Re: SS on HF bands
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org, wd5ivd@tapr.org

> >
> > My weekend experiments have convinced me that I would not like an SS
> > operator hopping over the entire 20m band, running more than 100
> > microwatts within 5 miles of my QTH.
> >
>
> Hello.

> I don't think you should make a choice between 'good' or 'bad' based
> on your overly simplistic and not very scientific experiment.

Err, wait a moment, I'll post my report today hopefully, it certainly isn't the be all to end all of propagation studied, but a considerable amount of effort was put into this, and extra special attention was paid to minimising the level of interference a SS signal could generate, including trying various different pulse shapes and power levels.

> Doing these types of analogy testing is good and can help people
> understand what is at work here -- but there are certain standards
> required when doing these types of testing to give them high
> trustworthiness and creditability.

I hope that my experiments have been done to a standard that will give the results a respectable degree of trustworthiness and credibility. Considerable effort was put into calibration and characterisation of both TX and RX. There is of course a large error margin (either way) on the results (mostly due to the terrain), however this was qualified and considered in context of the severity of the interference observed and environmental factors.

The report will be out soon.

Cheers,

Rob

From Robert.Glassey@nmp.nokia.com Tue Aug 06 04:41:32 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id EAA06170 for <hfsig@tapr.org>; Tue, 6 Aug 1996 04:41:29 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id MAA17525; Tue, 6 Aug 1996 12:40:26 +0300

Received: from by samail01.nmp.nokia.com with SMTP (1.37.109.16/16.2) id AA158734205; Tue, 6 Aug 1996 12:36:45 +0300

X-Openmail-Hops: 2

Date: Tue, 6 Aug 96 10:37:50 +0100

Message-Id: <H0000292022d798d@MHS>

In-Reply-To: <199608052239.PAA29230@servo.qualcomm.com>

Subject: [HFSIG:1444] Re: SS on HF bands

Sender: Robert.Glassey@nmp.nokia.com

To: hfsig@tapr.org, karn@qualcomm.com

> The one comment I have to Robert is this: yes, you may have been able
> to detect your signals given that you knew they were there and you
> were specifically looking for them. But being able to simply detect
> the simulated SS signal (especially on a quiet band) is not the same
> as saying they'd interfere with your ability to communicate under
> typical conditions.

Yes, listening for the signal does make it easier to hear, but I did not consider 'maybe' interference significant, only when clear tone or noise bursts could be heard. While you may not notice this when briefly listening to a signal, any such signals will become much more apparent when you listen for a longer time, especially if you are listening to a weak station. Typical conditions are not relevant, since this is not the area of concern, rather the concern is over the interference caused to signals that are already difficult to hear, caused by a hopping transmitter within a few miles.

> Would you have been able to detect them had there
> been a typical SSB signal on the channel in question, and if you had
> would it have caused any appreciable interference? That's the real

> issue here.

As it happens, 18MHz was quite an active band during my tests, and there were times when even on my 70cm long whip antenna a strong SSB signal came through strongly. In my tests I compared a constant carrier level with amateur and broadcast station levels, and pulsed interference with a constant carrier. My scanner with the whip antenna was not capable of receiving weak signals, being approximately 30dB less sensitive than my dipole at home, in the presence of external noise. Still, the interference could be heard although very strong amateur stations could overpower it.

More details in the report...

Cheers,

Rob

From n4cnw@pig.net Tue Aug 06 06:39:25 1996
Received: from mail.praxis.net (bigpig.pig.net [205.160.243.2]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id GAA09717 for <hfsig@tapr.org>; Tue, 6 Aug 1996 06:39:24 -0500 (CDT)
Received: from s402446 (s402446.orl.mmc.com) by mail.praxis.net with SMTP id AA19178
(5.67b/IDA-1.5 for <hfsig@tapr.org>); Tue, 6 Aug 1996 07:39:54 -0400
Message-Id: <320730BC.1500@pig.net>
Date: Tue, 06 Aug 1996 07:47:08 -0400
From: Mike Murphree <n4cnw@pig.net>
X-Mailer: Mozilla 2.02 (Win16; I)
Mime-Version: 1.0
To: hfsig@tapr.org
Subject: Re: [HFSIG:1454] EVM56002 ?
References: <199608060912.EAA05283@tapr.org>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Greg Jones wrote:

> There is an opportunity for TAPR to do a group purchase on the Motorola
> EVM56002 at a pretty low cost. Between 20 and 200 units would be the
> goal...same price no matter how many are purchased. Figure about \$60 under
> current commercial prices. No hard prices, because more work would have to
> be done.
>
> Would there be interest in this in the HF SIG ? Especially since Johan's
> code would run on it.

Sounds great considering the price is already only \$149.95 at the Design-Net price page (<http://www2.motorola-dsp.com/dsp/home/net/pg.html>).

They also offer a student discount of 20% reducing the price to \$120 + \$3 shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)

Mike N4CNW

From Robert.Glassey@nmp.nokia.com Tue Aug 06 10:07:33 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id KAA16453 for <hfsig@tapr.org>; Tue, 6 Aug 1996 10:07:31 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id SAA16974 for <hfsig@tapr.org>; Tue, 6 Aug 1996 18:06:59 +0300

Received: from by samail01.nmp.nokia.com with SMTP

(1.37.109.16/16.2) id AA135313801; Tue, 6 Aug 1996 18:03:22 +0300

X-Openmail-Hops: 2

Date: Tue, 6 Aug 96 16:04:00 +0100

Message-Id: <H0000292022d7998@MHS>

In-Reply-To: <199608060714.AAA17899@kaiwan009.kaiwan.com>

Subject: Amateur culture and not so wide modes

Mime-Version: 1.0

To: hfsig@tapr.org

Content-Type: text/plain; charset=ISO-8859-1; name="Amateur"

Content-Transfer-Encoding: 7bit

Hi Mike, good to hear another voice.

> I agree that a lot of hams learn more after being licensed than to be
> licensed. But my points were that 1. to GET the license requires ONLY
> rote memorization, and 2. unfortunately MOST hams never progress much
> beyond what is required.

True, but I have no problem with this. Nobodys lost out even if they never pick up a mic. At least they have explored an interest, even learnt something about radio, however little. Even appliance operators can get the itch to try something more, to get a bigger antenna, to try and work the repeater 50 miles away to talk to their friends over there, for many that small interest can develop into much more. One of the great things about amateur radio is that there is always more to try, no matter how far you get involved there is always more challenges, something new and interesting. Amateur radio encourages an understanding of radio in the wider community, to lift some of the mystery of this 'black art'. It might even help people understand how to tune their video recorders if their friend or relative is a ham :-). But seriously, ham radio is for everyone, expert, beginner, emergency operators, and even the appliance operator.

> One of the best things about amateur radio IMHO is its diversity. I
> think most of us will agree with this wholeheartedly. Nowhere have I
> seen a proposal to pursue any particular mode to the exclusion of all
> others. So I don't see abandonment of all narrowband technology as
> anything to be concerned about.

I hope not, just to reprint the few lines that started this thread off:

On 24th July Phil wrote:

> But it's precisely those 300 baud/1 KHz restrictions that I want to
> eliminate. Eventually I want to spread over the whole band with
> frequency hopping, but to start I'd like to do MFSK over SSB
> bandwidths.

This was said in the context of 'how much bandwidth can we hop over' and the opinions and attitudes that Costas called 'Narrow Band Thinking' in his classic paper (which I'm sure Phil has framed on his wall :-).

The idea here was simply to use an SSB channel. The previous discussion involved whether narrow or wide modes were better.

I personally go along with Phil to an extent. I like the idea of trying this mode out and developing the technology it uses. But while there may be gains in spreading over the whole band, those gains are for only a few, and may well be to the detriment of all other users. I am in favour of say a 10-25KHz allocation for all wide band channel sharing modes. I see considerable scope here for experimentation, and to overcome the problems of HF packet. (CSMA sharing using 300 baud on HF would be hilarious if people didn't actually try to use it!) It needs to be replaced, and this may be the answer. We need to get clever on this one, and not just rely on spreading to overcome interference to the users of this mode by lumping it on everyone else. I think the answer lies in coding and intelligent use of redundancy, combined with a small degree of hopping to use the transceiver filters to counter the few very strong signals (make them random 'hits'). 25kHz would be heaps, and if you don't need to worry about sharing with other modes, then you have much more freedom to try different techniques, without the constraints of non-interference to narrow band DX stations.

This could be thought of as not so much 'spread spectrum' but more a wide Code Division Multiple Access (CDMA) mode to replace the current wide (total spectrum usage) carrier sense (CSMA) HF packet system. (shades of "it's not a bomb" for those few New Zealand readers :-)

Sorry Phil, I think maybe I've overreacted a bit here, especially since your original comment was more to do with lifting the 1kHz 300 Baud restrictions in the US, and using an SSB channel, which I would support anyhow. Its spreading over the whole band that I and many others oppose. Maybe we've come full circle here, but I think a few good comments have come out.

Cheers,

Rob

From forrerj@peak.org Tue Aug 06 10:42:31 1996

Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id KAA17646 for <hfsig@tapr.org>; Tue, 6 Aug 1996 10:42:25 -0500 (CDT)

Received: from p00.t0.monrotel.com (p00.t0.monrotel.com [198.68.25.33]) by

PEAK.ORG (8.6.13/8.6.7) with SMTP id IAA23152 for <hfsig@tapr.org>; Tue, 6 Aug 1996 08:42:41 -0700

Message-Id: <199608061542.IAA23152@PEAK.ORG>

X-Sender: forrerj@peak.org (Unverified)

X-Mailer: Windows Eudora Version 1.4.4

Mime-Version: 1.0

Content-Type: text/plain; charset="us-ascii"

Date: Tue, 06 Aug 1996 08:31:19 -0800

To: hfsig@tapr.org

From: forrerj@peak.org (Johan Forrer.)

Subject: Re: [HFSIG:1457] Re: EVM56002 ?

Hi All,

Let me just recap what the possibilities are:

- A 60 MHz 56002, conservatively rated. Some have shown to run reliably at 80 MHz. (When executing multiple instructions per clock tick, this effectively translates to $60 \times 3 = 180$ MIPS or at a minimum, one instruction per clock tick - 60 MIPS). This is a 24-bit machine (120 dB dynamic range); for comparison, its TWICE as fast as the 16-bit DSP chip as used in the new Pactor II modem.
- The 56K instruction set looks a lot like Motorola's other microcontrollers, however, is a dual Harvard machine and a true DSP. It's a pleasure to write code for it.
- Has an on-board serial peripheral, some spare I/O lines and adequate memory for doing innovative programming projects.
- Comes with a very decent, full-screen, multiple windows, debugger that was developed by Domain Technologies. The debugger software is stable and has undergone several revisions giving you the benefit of user-feedback. The debugger is OnCe-based, i.e., uses special on-chip silicon to do non-intrusive debugging at full DSP speeds.
- A decent assembler with macro facilities. Public domain C compiler, linker, librarian and simulator is available.
- A port of the Alef Null monitor "Leonid" bridges the EVM and the Finnish DSP Card 4.
This gives you access to some outstanding software efforts.
- A substantial amount of amateur radio-related software including modems for packet, WEFAX, satellite work, and of course HF digital. To get on the air, you need the EVM and a PC that talks the KISS protocol. Several options are possible.

I own two EVM's myself that have been adapted for amateur radio use. One is configured as a single port radio modem and the other as a dual-port modem - it has expanded memory to 32K words in each of the P, X, and Y memory spaces. When I find the time, I hope to finish an article on the interface for this little beast. One of my future projects is to port the popular multitasking OS called uC O/S (micro-C O/S) to this expanded EVM. It would greatly simplify the development of multithreaded code, especially the kind of thing that is needed when implementing communications protocols. The EVM has plenty of spare horsepower to handle such a task in addition to real-time modems.

Anyone is interested in learning about DSP and am ready to tinker with it at the hardware level, this is a great opportunity. Be assured that the parts on the EVM alone is worth more than TAPR's asking price.

Forgive me if I sound like a Motorola sales person - I don't work for them, just am excited about this bit of hardware and want to make sure that you don't miss up on a good opportunity.

--Johan, KC7WW

>Greg Jones wrote:

>

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>> be done.

>>

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>

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>

>They also offer a student discount of 20% reducing the price to \$120 + \$3
>shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)

>

>Mike N4CNW

>

>

From mcdermot@rdxsunhost.aud.alcatel.com Tue Aug 06 13:03:39 1996

Received: from aud.alcatel.com (rockdal.aud.alcatel.com [128.251.30.1]) by
tapr.org (8.7.5/8.7.3/1.9) with SMTP id NAA23657 for <hfsig@tapr.org>; Tue, 6 Aug
1996 13:03:34 -0500 (CDT)

Received: from rdxsunhost.aud.alcatel.com.Aud.Alcatel.COM by aud.alcatel.com (4.1/
SMI-4.1)

id AA22108; Tue, 6 Aug 96 13:03:32 CDT

Received: from eagle.aud.alcatel.com by rdxsunhost.aud.alcatel.com.Aud.Alcatel.COM

(4.1/SMI-4.1)

id AA24330; Tue, 6 Aug 96 13:03:31 CDT

Received: by eagle.aud.alcatel.com (4.1/SMI-4.1)

id AA01687; Tue, 6 Aug 96 13:03:31 CDT

Date: Tue, 6 Aug 96 13:03:31 CDT

From: mcdermot@rdxsunhost.aud.alcatel.com (Tom Mcdermott)

Message-Id: <9608061803.AA01687@eagle.aud.alcatel.com>

To: hfsig@tapr.org

Subject: Re: [HFSIG:1447] Probability question

> This question has to do with HF ALE radios and their link establishment
> protocol. One radio sends out a sequence of ALE words. If the receiver
> finds these words 'appropriate' or 'correct' from its point of view, it will
> reply, etc. and the link is established. If the receiver detects so many
> 'inappropriate' or 'incorrect' or 'bad' ALE words in a row, it will
> disestablish the link and continue scanning. Now, if the probability that
> one received ALE word is incorrect is = P, and the sequence of ALE words is
> S long, then what is the probability that _at least_ Y words _in a row_ are
> incorrect? It's the "at least" and "in a row" that are giving me trouble!
>
> Rich
>
>

Rich: I did this rather quickly, but here's a guess:

the probability of Y& words in a row are incorrect should be:

$$(1 - P^Y)^{(S+1-Y)} \quad (1)$$

the probability of Y or more words in a row are incorrect should be:

$$\frac{(S-Y) \dots \backslash (1-P^{[Y+k]})^{(S+1-Y+k)} \dots /}{k=0} \quad (2)$$

Again, I have not spent the time to verify this. If P is small, then (1) may be sufficiently accurate.

- Tom

Tom McDermott
mcdermot@aud.alcatel.com

From Robert.Glassey@nmp.nokia.com Tue Aug 06 13:29:35 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org

(8.7.5/8.7.3/1.9) with SMTP id NAA24537 for <hfsig@tapr.org>; Tue, 6 Aug 1996 13:29:33 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id VAA29384 for <hfsig@tapr.org>; Tue, 6 Aug 1996 21:29:01 +0300

Received: from by samail01.nmp.nokia.com with SMTP
(1.37.109.16/16.2) id AA236545923; Tue, 6 Aug 1996 21:25:23 +0300

X-Openmail-Hops: 2

Date: Tue, 6 Aug 96 19:26:18 +0100

Message-Id: <H0000292022ed98b@MHS>

Subject: Pulses carrier propagation tests

Mime-Version: 1.0

To: hfsig@tapr.org

Content-Type: text/plain; charset=ISO-8859-1; name="Pulses"

Content-Transfer-Encoding: 7bit

Short Distance Ground Wave Propagation of Low Power Pulsed HF
Transmissions

Introduction

A series of tests were conducted to determine the propagation characteristics of low power pulsed transmissions on 18 MHz over a distance of 1 to 5 miles. The aim of this investigation was to determine the level of interference a frequency hopping spread spectrum transmitter would cause to nearby stations.

The Transmitter:

A Yaesu FT890AT transceiver was used, with the RF power control set to minimum. This gave an output power of about 3 Watts in CW mode, and the same in LSB mode when the audio drive was sufficient to cause the ALC to operate.

Power was further controlled by adjusting the audio input level in LSB mode. In this way output power was varied between 1 Watt and 10 mW pep. LSB was used since carrier suppression was best in this mode. The carrier was undetectable at 1/2 a mile using the receiver below.

The Built in ATU was used to tune the TX antenna. The TX antenna was an 80m dipole, 4m above the ground. Other amateur station may well use better antennas for transmission.

The audio source was an 8 bit PC sound card.

The Receiver:

Yupiteru MVT7100 handheld scanner, with a 1m whip antenna, or a simple dipole and balun resonating around 18MHz.

Using the unmatched 1m whip antenna received signal levels were 10dB below the dipole with a 20dB attenuator, in the same position. When the dipole was used the MVT7100's built-in 20dB attenuator had to be used due to the poor intermod performance of the receiver. This the whip was 30dB less sensitive than the dipole.

To account for the external noise floor the SNR of weak signals using the MVT7100 + dipole + 20dB attenuator was compared with the FT890 + same dipole. The SNR from the MVT7100 was about 10dB worse. i.e. the 20dB attenuator results in a 10dB drop in SNR since the noise floor from the dipole is about 10dB above the MVT7100 noise floor without the attenuator. Thus the noise floor drops only 10dB while the signal drops 20dB. The SNR of a typical DX setup with directional antennas (lower noise) high off the ground (stronger signal) is probably about 10 dB or better than the low RX dipole I used. Thus the MVT710 + low dipole + 20dB attenuator is about $10+10 = 20$ dB worst than a typical DX setup.

The whip antenna was found to be 10dB worst than the dipole + 20dB attenuator. Since SNR with the attenuator and dipole was not limited by the external noise floor, the whip antenna has 30dB lower SNR than a typical DX setup.

The Terrain:

The surrounding area is hilly, part pine forest, and part a lightly wooded common with some rough open areas. Total wooded area is around 20 square miles. The hills are formed by the erosion of a plateau a few remaining parts of the flat plateau at the hill tops. The plateau is about 120-130m ASL. The site is 30 miles inland. The TX site is on the edge of the wooded land in a built up area, 121m ASL.

The Tests:

CW tests were done with 3 Watts, on 18.090 MHz. Only the whip was used to determine the extent and characteristics of propagation in this area. The signal was compared with the strength of amateur stations and broadcast stations.

Pseudo Frequency Hopping Spread Spectrum tests were done by transmitting a series of pulsed carriers at random frequencies and times to simulate a Frequency Hopping Spread Spectrum signal as it would appear in a 2.4 kHz bandwidth. The pulses were generated using shaped audio tone bursts to modulate the transmitter in LSB mode. The LSB suppressed carrier frequency was 18.150 MHz.

A series of different PFHSS tests were done trying different PEP power levels and pulse shapes. A constant carrier was also transmitted for reference at each power level.

Four pulse shapes were used, these are described below.

The timing of the pulses followed a Poisson distribution. The mean pulse rate varied depending upon the test.

Power levels were: 1 Watt, 100mW, 10mW, and a CW ID for each test at 3 Watts.

Pulse 1: Square 2ms pulsed tones, random phase and audio frequency 300-2700Hz. Mean pulse rate was 3.4 pulses per second. (equivalent to frequency hopping spread spectrum as appears in a 2.4kHz bandwidth when spread over 350kHz with a 2ms dwell time.)

Pulse 2: Raised cosine pulsed tone, 4ms total, -6db pulse duration 2ms. Random phase and frequency with the same pulse positioning as 1.

Pulse 3: 10ms pulsed tones, raised cosine edge shaping, 2ms each side, 10ms total pulse length. FHSS equivalent hopping rate would be 1.4 seconds per pulse. The pulse rate used was twice this, so enough pulses could be heard to determine the signal level. Audio frequency and phase were random.

Pulse 4: 30ms modulated pulsed tones. No shaping, but random BPSK modulation at 2000 bps. Equivalent FHSS pulse rate would be 4.4 seconds per pulse. The rate used was 1.1 seconds per pulse. Centre frequency and phase were random.

Each test lasted 20 seconds. The computer was set up to sequence through the four pulse tests plus a CW test, at each power level. Each test and power level had a unique morse ID.

The Results:

CW measurements.

The 3 watt CW signal was easily heard in all locations with the MVT7100 and whip antenna beyond 5 miles. At 5 miles the signal was just audible with the whip antenna and the 20 dB attenuator on.

Typical signal levels at 1 to 1.5 miles on in good DX locations (on hill tops at the same level as the TX) were 10-30dB above the strongest amateur stations on 18MHz and 14MHz (using the attenuator and calibrated S meter), and 10-30dB below the strongest broadcast stations (BBC, Deutchewelle, VOA, VORussia, Radio Canada) The signal strength was effected more by terrain than distance. The strongest broadcast stations were typically 30-40dB above the strongest amateur stations. Tests were done between 8pm and 10pm local daylight saving time (GMT+1) on Friday 2/8/96.

Pulsed tests.

SOUND: Pulses 1,2,3 all had discernible tones. Pulse 1 was least discernible, pulse 2 was slightly more pronounced, pulse 3 had a clearly discernible tone. The modulated tone, pulse 4, sounded like a burst of noise, with a discernible beginning, end and pitch. Pulse streams 1 and 2 sounded like many taps dripping water into many buckets, all with different pitches. Pulse stream 3 were clear tone bursts. On air any of these pulses were easily distinguishable from a static click and would be annoying however infrequent.

AUDIBILITY: Pulses 1 and 2 seemed to be about the same loudness in the presence of noise, and were the softest of the four pulses. Pulse 3 was more audible, and pulse 4 was the clearest. In terms of signal strength, pulses 1 and 2 required 20dB more power than a CW signal to be audible. Pulses 3 and 4 required 10dB more power. (these results came from comparing received signals with different TX powers).

RANGE:

RX measurements were made between 1 and 3 miles from the TX, with both the whip and dipole antenna. Again signal strength depended more upon terrain than distance, although there was a clear difference between 1 and 3 miles. Distances were measure using an Ordinance Survey Map 1:50,000. (standard British maps) These are pretty good maps.

At good receiving sites (on flat ground or hill tops on the same level as the TX) all tests were audible with 1 Watt TX power and the whip antenna at a range of 1-3 miles.

At some sites the 100mW pulse 1 and 2 tests could not be heard with the whip antenna, but tests 3 and 4 could be heard. Using the dipole antenna and the 20dB attenuator often made the pulse 1 and 2 tests audible in these cases.

At 3 miles only the 10mW carrier could be heard, no other 10mW tests could be heard with the whip antenna.

At 1 mile the 100mW pulse 1 and 2 tests could often be heard with the whip antenna. In one case at a distance of 1 mile, the 10mW pulse 1 and 2 tests were clearly audible with the whip antenna.

Since whip antenna was estimated to be more than 30dB less sensitive than a good amateur station when the external noise floor is considered (see above), thus if 1 watt TX power is heard using the whip antenna then 1mW will be heard by a good amateur station. In the case where 10mW pulse 1 and 2 TX power was heard clearly at 1 mile, a good amateur station would hear a 10uW 2ms carrier burst.

Conclusion:

Signal strengths of a 3 Watt CW transmitter at a distance of 1 mile were considerable greater (10-30dB) than any other amateur stations heard on

the band.

Shorter pulse lengths are less audible, despite being more frequent.

Attempting to spread a long (30ms) tone to make it less noticeable did not work.

A 1mW 2ms pulse at 18MHz would be clearly audible above the ambient noise floor by a good amateur station up to 3 miles from the transmitter site.

A 10uW 2ms pulse at 18MHz may well be heard by a good amateur station at a distance of 1 mile.

Interference may be more severe if the TX station has a better antenna than a 80m dipole 4m above the ground.

Possible Further Work:

Interference decreased as the pulse length got shorter, and subjectively the sound was less annoying. If pulse length was made even shorter, say 0.1ms, then the subjective effect of the pulse may be acceptable. Such a short pulse length would spread power wider than a single SSB channel, further reducing the level of the received pulse, and also making it more compatible with common impulse noise blankers. If such a short dwell time were used in a hopping system, spreading over 350kHz, then the average pulse rate in a narrow receiver bandwidth (<3kHz) would be:

$$\begin{aligned}\text{Rate} &= \frac{\text{pulse_band_width}}{\text{total_band}} / \text{dwell_time} \\ &= 20 / 350 / 100\text{E-}6 \\ &= 571 \text{ pulses per second on average.}\end{aligned}$$

This would probably be unacceptable, since the average energy in the receiver bandwidth would be high and not easily dealt with. This would probably be very similar to a direct sequence system.

If spread over 15MHz, rate = 13 pulses per second on average.

The ideal dwell time (pulse length) would probably be in the range 0.1 to 0.5 ms. Further investigation would be required.

Further reduction in pulse rate could be achieved by trading off more power for fewer pulses, if the pulses are short enough to sound sufficiently noise like.

Interference from such a system may be acceptable.

From zs6awk@global.co.za Tue Aug 06 15:38:02 1996
Received: from lin01.global.co.za (lin01.global.co.za [196.3.164.2]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id PAA29566 for <hfsig@tapr.org>; Tue, 6 Aug 1996 15:37:45 -0500 (CDT)
Received: from anx_19.global.co.za (anx_19.global.co.za [196.3.168.29]) by lin01.global.co.za (8.7.3/8.7.3) with SMTP id WAA21477 for <hfsig@tapr.org>; Tue, 6 Aug 1996 22:36:26 -0200 (GMT)
Message-Id: <199608070036.WAA21477@lin01.global.co.za>
X-Sender: zs6awk@mail.global.co.za
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 06 Aug 1996 22:38:46 +0200
To: hfsig@tapr.org
From: zs6awk@global.co.za (Danie Brynard)
Subject: Re: [HFSIG:1459] Re: EVM56002 ?

I can only agree: the DSP56002EVM is a wonderfull piece of hardware. I have been in love with mine for 1.5 years :-)

Newcomers please see the software list on the wooster.hut.fi site in Finland and Johan's compendium on the TAPR web site.

cu es 73 de Danie zs6awk

>Hi All,
>
>Let me just recap what the possibilities are:
>
>- A 60 MHz 56002, conservatively rated. Some have shown to run reliably at
>80 MHz. (When executing multiple instructions per clock tick, this
>effectively translates
> to 60*3=180 MIPS or at a minimum, one instruction per clock tick - 60 MIPS).
> This is a 24-bit machine (120 dB dynamic range); for comparison, its
TWICE as
> fast as the 16-bit DSP chip as used in the new Pactor II modem.
>
>- The 56K instruction set looks a lot like Motorola's other microcontrollers,
> however, is a dual Harvard machine and a true DSP. It's a pleasure to
>write code
> for it.
>
>- Has an on-board serial peripheral, some spare I/O lines and adequate
>memory for
> doing innovative programming projects.
>
>- Comes with a very decent, full-screen, multiple windows, debugger that was
>developed
> by Domain Technologies. The debugger software is stable and has undergone
>several
> revisions giving you the benefit of user-feedback. The debugger is
>OnCe-based, i.e.,

> uses special on-chip silicon to do non-intrusive debugging at full DSP speeds.

>

>- A decent assembler with macro facilities. Public domain C compiler, linker, librarian and simulator is available.

>

>- A port of the Alef Null monitor "Leonid" bridges the EVM and the Finnish >DSP Card 4.

> This gives you access to some outstanding software efforts.

>

>- A substantial amount of amateur radio-related software including modems >for packet,

> WEFAX, satellite work, and of course HF digital. To get on the air, you >need the EVM and a PC that talks the KISS protocol. Several options are >possible.

>

>

>I own two EVM's myself that have been adapted for amateur radio use. One is >configured as a single port radio modem and the other as a dual-port modem - >it has expanded memory to 32K words in each of the P, X, and Y memory >spaces. When I find the time, I hope to finish an article on the interface >for this little beast. One of my future projects is to port the popular >multitasking OS called uC O/S (micro-C O/S) to this expanded EVM. It would >greatly simplify the development of multithreaded code, especially the kind >of thing that is needed when implementing communications protocols. The EVM >has plenty of spare horsepower to handle such a task in addition to >real-time modems.

>

>Anyone is interested in learning about DSP and am ready to tinker with it at >the hardware level, this is a great opportunity. Be assured that the parts >on the EVM alone is worth more than TAPR's asking price.

>

>Forgive me if I sound like a Motorola sales person - I don't work for them, >just am excited about this bit of hardware and want to make sure that you >don't miss up on a good opportunity.

>

>

>--Johan, KC7WW

>

>

>>Greg Jones wrote:

>>

>>> There is an opportunity for TAPR to do a group purchase on the Motorola >>> EVM56002 at a pretty low cost. Between 20 and 200 units would be the >>> goal...same price no matter how many are purchased. Figure about \$60 under >>> current commercial prices. No hard prices, because more work would have to >>> be done.

>>>

>>> Would there be interest in this in the HF SIG ? Especially since Johan's >>> code would run on it.

>>

>>Sounds great considering the price is already only \$149.95 at the >>Design-Net price page (<http://www2.motorola-dsp.com/dsp/home/net/pg.html>).

>>
>>They also offer a student discount of 20% reducing the price to \$120 + \$3
>>shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)
>>
>>Mike N4CNW
>>
>>
>
>

From forrerj@peak.org Tue Aug 06 17:09:39 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id RAA03064 for <hfsig@tapr.org>; Tue, 6 Aug 1996
17:09:37 -0500 (CDT)
Received: from p03.t0.monrotel.com (p03.t0.monrotel.com [198.68.25.36]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id PAA00762 for <hfsig@tapr.org>; Tue, 6 Aug
1996 15:09:43 -0700
Message-Id: <199608062209.PAA00762@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 06 Aug 1996 14:58:31 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1459] Re: EVM56002 ?

>Hi All,
>
>Let me just recap what the possibilities are:
>
>- A 60 MHz 56002, conservatively rated. Some have shown to run reliably at
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> This is a 24-bit machine (120 dB dynamic range); for comparison, its
TWICE as
> fast as the 16-bit DSP chip as used in the new Pactor II modem.

Correction: MIPS factor is actually CLOCK/2, thus the 66 MHz chip
runs at 33 MIPS and the 80 MHz versions at 40 MIPS.

Sorry about that.

--Johan

>
>- The 56K instruction set looks a lot like Motorola's other microcontrollers,
> however, is a dual Harvard machine and a true DSP. It's a pleasure to

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>
>
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>
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>>

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>>shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)

>>

>>Mike N4CNW

>>

>>

>

>

From karn@qualcomm.com Tue Aug 06 22:46:45 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org
(8.7.5/8.7.3/1.9) with ESMTP id WAA15642 for <hfsig@tapr.org>; Tue, 6 Aug 1996
22:46:43 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id
UAA18246; Tue, 6 Aug 1996 20:46:11 -0700 (PDT)

Date: Tue, 6 Aug 1996 20:46:11 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608070346.UAA18246@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <1996Aug05.120248.1604.258127@ntcit-mmta6.ntc.nokia.com>
(sivula@ncsnrs01es.ntc.nokia.com)

Subject: Re: [HFSIG:1440] Re: Amateur culture

>Well, what about its educational influence? I do not know whether this
>applies internationally, please advice me, but in Finland the amateur
>hobby has very often lead starting technical studies. In this way I
>think that society has

This is exactly my point. In my opinion, the climate toward technical
education and experimentation in at least the US amateur world has
been rather hostile, as evidenced by the attitudes toward the no-code
license and spread spectrum and the tiny fraction of hams doing
serious technical experimentation. Not to mention the fact that
amateur technology is seriously behind the state of the art. And then
you have the armchair lawyers that always seem to appear out of
nowhere to claim that anything even slightly new and novel has got to
violate some FCC rule somewhere, usually (but not always) the
prohibition against codes and ciphers.

Ragchewing, contesting and DXing seem to be 99.9999% of ham radio. While I don't really object to these, it's hard to argue that they carry much weight with the non-amateur public that owns our spectrum.

The points you mention about experimentation, the training of operators and the like are specifically listed in the US amateur rules. Actually, I do agree that ham radio serves a valuable purpose even if the technical experimentation isn't leading-edge; just advancing one's own personal skills are enough. But even with this low standard, only a minority of the amateur population really take advantage of the opportunity. The rest engage in what can best be described as electronic stamp-collecting.

Phil

From karn@qualcomm.com Tue Aug 06 23:33:55 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id XAA17282 for <hfsig@tapr.org>; Tue, 6 Aug 1996 23:33:52 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id VAA18353; Tue, 6 Aug 1996 21:33:19 -0700 (PDT)
Date: Tue, 6 Aug 1996 21:33:19 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608070433.VAA18353@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <9608061803.AA01687@eagle.aud.alcatel.com> (mcdermot@rdxsunhost.aud.alcatel.com)
Subject: Re: [HFSIG:1460] Re: Probability question

Tom McD's answer:

>the probability of Y& words in a row are incorrect should be:

> $(1 - P^Y)^{(S+1-Y)}$ (1)
[...]

I get a somewhat different answer. Or at least I followed a different analysis.

The probability that the very first Y symbols in the block of S (with $S \geq Y$) are correct (with individual probability of symbol error P) is

$$(1-P)^Y$$

Now add to this the probability that the first symbol is in error, but the next Y consecutive symbols are correct:

$$P * (1-P)^Y$$

And the probability that the first TWO symbols are in error, but the next Y are correct (assuming $S \geq Y+2$):

$$P^2 * (1-P)^Y$$

and so on, summing each term until your "sliding window" of Y contiguous correct symbols bumps into the end of the block of S symbols. The resulting sum will be the overall probability of success.

This same analysis would have been directly applicable to another interesting amateur problem from years back. If your probability of error in copying a Morse character under exam conditions is a constant P, your errors are all independent (both obviously questionable assumptions) and the FCC rules required you to copy one solid minute out of 5, then what was your overall probability of passing the code test? :-)

Phil

From karn@qualcomm.com Wed Aug 07 00:38:04 1996

Received: from warlock.qualcomm.com (warlock.qualcomm.com [129.46.52.129]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id AAA23698 for <hfsig@tapr.org>; Wed, 7 Aug 1996 00:38:02 -0500 (CDT)

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by warlock.qualcomm.com (8.7.5/1.2d/8.7.2/1.11) with ESMTP id WAA11819 for <hfsig@tapr.org>; Tue, 6 Aug 1996 22:37:02 -0700 (PDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id WAA18424; Tue, 6 Aug 1996 22:36:14 -0700 (PDT)

Date: Tue, 6 Aug 1996 22:36:14 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608070536.WAA18424@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <H0000292022ed98b@MHS> (Robert.Glassey@nmp.nokia.com)

Subject: Re: [HFSIG:1461] Pulses carrier propagation tests

Robert,

Very good work -- even if the results aren't as positive as I would have liked. I was especially interested to see you try different pulse durations and modulating waveforms. Since this is inherently a subjective test (i.e., is the signal "audible" or "annoying" to the SSB listener), giving subjective results is reasonable.

I concede that you've shown that under your specific test conditions, FHSS interference can be subjectively annoying to a human listener, even if it doesn't necessarily interfere with communications. This is a useful result. It means we need some form of dynamic coordination with ones' neighbors if SS is to be used operationally on the ham bands under similar conditions. I believe this is a practical idea, and that a flat prohibition of SS in the rules is still not necessary.

Indeed, it's not too hard to conceive of a scheme whereby a local narrowband user broadcasts his listen frequency on a VHF packet channel, alerting a nearby SS transmitter to "cut a hole" in his emission. Or it could be much simpler than that, by simply monitoring for strong local narrowband signals at the SS receiver and temporarily

cutting them out of the hopping sequence for some period of time, such as a few minutes. I.e., the narrowband user need only transmit on the channel when the SS station is listening and that would do the trick. (I do confess this wouldn't necessarily work for split-frequency DX operations -- which brings us back to "protected DX subbands".)

Anyway, think of this adaptive channel-blanking scheme as a variation of my MACA multiple access algorithm, which is in turn based on "busy tone multiple access" (BTMA). The common theme to all three is the ability of a receiver to say "shhh, I'm listening" to its neighboring transmitters.

If the total number of hopping channels is large compared to the number of blanked channels, the SS transmitter probably wouldn't even have to tell the receiver about the new hopping sequence. FEC coding would fix the gap at the receiver.

Anyway, there are all sorts of clever ways one might mitigate SS/narrowband interference; I came up with this one in just the few minutes that I've been typing this message. If we succeed, I think the FCC would look quite favorably on us as they've been wrestling with these sorts of dynamic spectrum sharing issues for a long time. The ham bands are a perfect testing ground for this kind of thing. And I can think of other applications for adaptive channel protection -- operating in radio quiet zones, for example. Instead of having to stay off the air entirely within the zone, you'd monitor a special packet channel and forego transmitting only when the protected receiver is actually in operation.

My one major quibble with your results comes from your 30dB extrapolation from the whip RX antenna to a "good amateur station". I would like to see you try it with a *real* "good amateur station". I.e., a local ham friend, if one is close enough to you, especially if he/she has a beam that can be rotated to test the effects of antenna directivity.

In the further work category, it would be interesting to try some objective tests of simulated FHSS interference against existing amateur digital schemes. It would be especially interesting to see how Clover, Pactor, G-TOR etc compare to each other against this kind of pulsed QRM. If the FEC in these schemes are able to handle it well, then one possibility is to permit spread spectrum within those band segments where these schemes are currently popular. Of course, being smaller than a whole band the "hit rate" on any given channel would be greater. But with the increasing popularity of these schemes, perhaps the hopping range will soon be extended to the whole "CW" portion of each band. :-)

Hmm. Perhaps instead of having band segments for "DX" and "local" (or perhaps in addition), we could divide up the HF bands into "machine" and "manual" subbands. Existing CW and SSB/AM would be combined into a "manual" subband, while the "machine" section would accomodate all digital schemes intended for machine reception, including spread

spectrum. The thinking, of course, is that emissions in the "machine" subband would be likely FEC coded in a way to resist the burst interference of FHSS while the "manual" emissions would not.

And there is again the possibility of simply not hopping at all unless you have to (e.g., when the band is evenly crowded). But this leaves us with another question -- given the clear benefits of FEC coding, which substantially reduces power requirements at the expense of bandwidth, how much wider should such signals be allowed to be assuming they don't take up the whole band?

One approach to the problem is to count how many nearby neighbors N you are likely to have on the band at any time and let each use no more than $1/N$ of the band. That way you can preserve just enough orthogonality to solve the near-far problem without denying everyone the benefits of at least some bandwidth expansion. This is really just an explicit, manual form of the "adaptive notching" mentioned above, and I tend to prefer automatic methods over manual ones.

Comments?

Phil

From karn@qualcomm.com Wed Aug 07 03:28:21 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id DAA29326 for <hfsig@tapr.org>; Wed, 7 Aug 1996 03:28:20 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id BAA18788; Wed, 7 Aug 1996 01:27:48 -0700 (PDT)

Date: Wed, 7 Aug 1996 01:27:48 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608070827.BAA18788@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <01BB8304.4FA5E2C0@jblbloom.connix.com> (message from Jon Bloom on Mon, 5 Aug 1996 18:43:00 -0500 (CDT))

Subject: Re: [HFSIG:1446] Re: Amateur culture

>As it applies to the current HFSIG discussions, I think that part of
>our educational process should include investigating new techniques and
>technologies. On that basis, I'd love to see some exploration of SS
>techniques on HF. But since nowhere in Part 97 is the rationale for
>Amateur Radio stated as the development of a maximally efficient
>communication system, it's not a given--at least to me--that we should
>abandon all narrowband activity in favor of an SS system even if such
>a system can be shown to be more spectrum-efficient in theory and
>practice. Which means that any SS system must coexist with narrowband
>uses of the spectrum by whatever means make that possible.

There are compelling reasons to investigate spread spectrum that go beyond spectral efficiency -- as important as that may be, both to us directly and as a testing ground for other services. SS is increasingly important as a commercial technology, and this trend is certain to continue. If the Part 97.1 notion of "training a reservoir

of skilled technicians" is to have any relevance to the outside world, this is a technology that amateurs should be exposed to, preferably in as wide a variety of settings (e.g., frequency bands) as possible. This doesn't mean completely displacing traditional narrowband operations, but it does mean that reasonable accommodations should be made for it instead of banishing it entirely to the upper microwave spectrum (the NIMBY syndrome).

Phil

From ssykes@emirates.net.ae Wed Aug 07 07:21:31 1996
Received: from ns2.emirates.net.ae (ns2.emirates.net.ae [194.170.1.7]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id HAA06745 for <hfsig@tapr.org>; Wed, 7 Aug 1996 07:21:27 -0500 (CDT)
Received: from csa106.emirates.net.ae (csa106.emirates.net.ae [194.170.2.106]) by ns2.emirates.net.ae (SMI-8.6/8.6) with SMTP id QAA00263 for <hfsig@tapr.org>; Wed, 7 Aug 1996 16:21:20 +0400
Received: by csa106.emirates.net.ae with Microsoft Mail id <01BB847C.8A8E18C0@csa106.emirates.net.ae>; Wed, 7 Aug 1996 16:21:51 +0400
Message-ID: <01BB847C.8A8E18C0@csa106.emirates.net.ae>
From: Stephan Sykes <ssykes@emirates.net.ae>
To: "'hfsig@tapr.org'" <hfsig@tapr.org>
Subject: RE: [HFSIG:1454] EVM56002 ?
Date: Wed, 7 Aug 1996 06:46:15 +0400
Encoding: 26 TEXT

If it is around the price you quoted, please count me in.

Steve Sykes KD2OM/A61AA

From: Greg Jones[SMTP:wd5ivd@tapr.org]
Sent: Tuesday, August 06, 1996 8:26 AM
To: hfsig@tapr.org
Subject: [HFSIG:1454] EVM56002 ?

There is an opportunity for TAPR to do a group purchase on the Motorola EVM56002 at a pretty low cost. Between 20 and 200 units would be the goal...same price no matter how many are purchased. Figure about \$60 under current commercial prices. No hard prices, because more work would have to be done.

Would there be interest in this in the HF SIG ? Especially since Johan's code would run on it.

I have spoken with Johan and he thinks it would be great...what are some other reactions.

Cheers - Greg, WD5IVD

From LANIER.R.A-@smtpgty.bwi.wec.com Wed Aug 07 09:22:52 1996
Received: from tron.bwi.wec.com (tron.bwi.wec.com [129.228.4.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id JAA10245 for <hfsig@tapr.org>; Wed, 7 Aug 1996
09:22:49 -0500 (CDT)
Received: from smtpgty.bwi.wec.com by tron.bwi.wec.com;
(5.65/1.1.8.2/31May95-0229PM)
id AA06334; Wed, 7 Aug 1996 10:09:21 -0400
Received: from ccMail by smtpgty.bwi.wec.com
(IMA Internet Exchange 2.0 Enterprise) id 208A69E0; Wed, 7 Aug 96 10:22:22 -0400
Mime-Version: 1.0
Date: Tue, 6 Aug 1996 11:08:32 -0400
Message-Id: <208A69E0.1858@smtpgty.bwi.wec.com>
From: LANIER.R.A-@smtpgty.bwi.wec.com (LANIER.R.A-)
Subject: Re: [HFSIG:1432] Re: Wide band modes
To: hfsig@tapr.org
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Description: cc:Mail note part

>You are exactly right -- different convolutional codes can indeed be
>used to differentiate between signals; it's an entirely viable form
>of CDMA. If the code rate is low enough, then this is virtually
>identical to coded direct sequence spread spectrum! In fact, Andrew
>Viterbi invented such a scheme a few years ago and published a paper
>about it.

Phil,

What is the name of the paper you are talking about here?

Tony

From LANIER.R.A-@smtpgty.bwi.wec.com Wed Aug 07 09:28:28 1996
Received: from tron.bwi.wec.com (tron.bwi.wec.com [129.228.4.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id JAA10366 for <hfsig@tapr.org>; Wed, 7 Aug 1996
09:28:25 -0500 (CDT)
Received: from smtpgty.bwi.wec.com by tron.bwi.wec.com;
(5.65/1.1.8.2/31May95-0229PM)
id AA10281; Wed, 7 Aug 1996 10:14:43 -0400
Received: from ccMail by smtpgty.bwi.wec.com
(IMA Internet Exchange 2.0 Enterprise) id 208A7380; Wed, 7 Aug 96 10:24:56 -0400
Mime-Version: 1.0
Date: Tue, 6 Aug 1996 11:24:35 -0400
Message-Id: <208A7380.1858@smtpgty.bwi.wec.com>
From: LANIER.R.A-@smtpgty.bwi.wec.com (LANIER.R.A-)

Subject: Re: [HFSIG:1429] Re: SS on HF bands
To: hfsig@tapr.org
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit
Content-Description: cc:Mail note part

While experimentation and self-training are certainly important reasons to keep ham radio going, they are no the ONLY reasons. Has anyone seen the movie 'Independence Day' ? After the aliens had basically taken the world over, all satellite communications were broken. World governments could not communicate with each other. However, there was one way they could - amateur radio using morse code! There is a scene where radio operators are frantically using keys to relay information.

This was a very positive image for ham radio operators. Keeping amateur radio going for BOTH emergency communications AND advancing the state of the art is why amateur radio should be kept alive.

Ham radio is NOT just a hobby!!!

73s de
Tony, KE4ATO

----- Reply Separator -----
Subject: [HFSIG:1429] Re: SS on HF bands
Author: hfsig@tapr.org at BALT.SMTP
Date: 8/5/96 12:40 AM

I guess it boils down to what you think ham radio is all about. Reliable communications? That description hardly fits direct long-haul HF. Easily accessible to those without large lots, liberal housing covenants and money for big antennas and power amplifiers? I think not. The popularity of VHF/FM and repeater networks shows there are a lot of hams who are interested primarily in reliable local communications with small stations, and who aren't purists when it comes to using relays. Spread spectrum promises to provide the same capabilities over wider areas on HF.

I confess that perhaps my view of ham radio is somewhat different than yours. About the only activity that has a hope of justifying our bands for very long is technical self-training, experimentation and advancement. That means keeping up with the state of the art in the non-amateur world, and spread spectrum is certainly one technology where we trail the commercial and military world. While I don't really have anything against DXing and contesting, I really don't see how they help justify ham radio's existence to the outside world; they're really little more than technological stamp-collecting.

I don't want to do away with traditional hamming, but I don't want it to choke experimentation either. While I can't guarantee that there

won't ever be any SS interference to narrowband modes, I think it can be minimized by careful system design and operational coordination. And whatever risks there are will be worth the benefits. After all, ours is not a critical safety-of-life service like aviation; we're supposed to be experimenters, and experiments can fail. That's part of the process.

Phil

From hardie@duke.usask.ca Wed Aug 07 12:01:47 1996
Received: from duke.usask.ca ([128.233.3.13]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id MAA16698 for <hfsig@tapr.org>; Wed, 7 Aug 1996 12:01:45 -0500 (CDT)
Received: from localhost (hardie@localhost) by duke.usask.ca (8.7.3/8.7.3) with SMTP id LAA04315 for <hfsig@tapr.org>; Wed, 7 Aug 1996 11:01:43 -0600 (CST)
Date: Wed, 7 Aug 1996 11:01:43 -0600 (CST)
From: Pete Hardie <hardie@duke.usask.ca>
To: hfsig@tapr.org
Subject: Re: [HFSIG:1464] Re: Amateur culture
In-Reply-To: <199608070346.UAA18246@servo.qualcomm.com>
Message-ID: <Pine.OSF.3.95.960807103956.23754A-1000000@duke.usask.ca>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

On Tue, 6 Aug 1996, Phil Karn wrote:

> Ragchewing, contesting and DXing seem to be 99.9999% of ham radio.
> While I don't really object to these, it's hard to argue that they
> carry much weight with the non-amateur public that owns our spectrum.
>
>
> [They] engage in what can best be described as electronic stamp-collecting.

Two points Phil:

1. Without those 99.9999%, the remaining .0001% would not have *any* spectrum to experiment in at all.
2. The vast majority of amateurs (myself included) do not have the ability or, to be generous, sufficient education to ever be in a position to experiment with SS or other advanced digital modes of communication.

I think the idea that amateurs ever made any significant advances in radio technology is largely a myth. There's no way that your average ham, 60 or more years ago, could start with a CW/AM rig and tinker around with it and come up with SSB. Any ham who did make an advance in technology was, like Phil, a highly educated person who already had the background to be able to understand what they were doing *without* a ham radio license. All the license did for them was give them access to spectrum where they could experiment.

73 de Pete (still struggling to make that EZ-KIT transmit a packet :-)
ve5va.qrp@usask.ca

From chbrain@dircon.co.uk Wed Aug 07 16:28:30 1996
Received: from felix.dircon.co.uk (felix.dircon.co.uk [193.128.224.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id QAA28731 for <hfsig@tapr.org>; Wed, 7 Aug 1996 16:26:08 -0500 (CDT)
Received: by felix.dircon.co.uk id AA19092
(5.67b/IDA-1.5 for <hfsig@tapr.org>); Wed, 7 Aug 1996 22:25:48 +0100
Received: from gw2-151.pool.dircon.co.uk(194.112.35.151) by amnesiac via smap (V1.3)
id sma019080; Wed Aug 7 22:25:17 1996
Message-Id: <1.5.4.32.19960807211115.0067efd0@popmail.dircon.co.uk>
X-Sender: chbrain@popmail.dircon.co.uk
X-Mailer: Windows Eudora Light Version 1.5.4 (32)
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 07 Aug 1996 22:11:15 +0100
To: hfsig@tapr.org
From: Charles Brain <chbrain@dircon.co.uk>
Subject: Re: [HFSIG:1471] Re: Amateur culture

I would like to disagree with the following because if it had not been for amateur radio I would never have got interested in electronics, never would have done a degree in the subject and never would have earned a living doing electronics.

My first introduction to the hobby was at the age of eleven when I used to listen to old timers Rag chewing on 160 m.

Also an amateur in the early days was reported to have told Marconi when he met him that he was 'only' an amateur, Marconi replied so am I.

>I think the idea that amateurs ever made any significant advances in radio
>technology is largely a myth. There's no way that your average ham, 60 or
>more years ago, could start with a CW/AM rig and tinker around with it and
>come up with SSB. Any ham who did make an advance in technology was, like
>Phil, a highly educated person who already had the background to be able
>to understand what they were doing *without* a ham radio license. All the
>license did for them was give them access to spectrum where they could
>experiment.

>

>73 de Pete (still struggling to make that EZ-KIT transmit a packet :-)

>ve5va.qrp@usask.ca

>

Regards Charles

From karn@qualcomm.com Wed Aug 07 20:04:12 1996
Received: from warlock.qualcomm.com (warlock.qualcomm.com [129.46.52.129]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTTP id UAA07105 for <hfsig@tapr.org>; Wed, 7 Aug 1996 20:04:08 -0500 (CDT)
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by warlock.qualcomm.com (8.7.5/1.2d/8.7.2/1.11) with ESMTTP id SAA22697 for

<hfsig@tapr.org>; Wed, 7 Aug 1996 18:03:07 -0700 (PDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id
SAA19732; Wed, 7 Aug 1996 18:02:19 -0700 (PDT)
Date: Wed, 7 Aug 1996 18:02:19 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608080102.SAA19732@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <Pine.OSF.3.95.960807103956.23754A-1000000@duke.usask.ca> (message
from Pete Hardie on Wed, 7 Aug 1996 12:07:51 -0500 (CDT))
Subject: Re: [HFSIG:1471] Re: Amateur culture

>1. Without those 99.9999%, the remaining .0001% would not have *any*
>spectrum to experiment in at all.

Why do you say that? The US rules specifically mention
experimentation, training and development. Presumably that (and public
service and international goodwill) is why they gave us spectrum.
They don't mention ragchewing, DX and contesting, one way or the
other.

>2. The vast majority of amateurs (myself included) do not have the ability
>or, to be generous, sufficient education to ever be in a position to
>experiment with SS or other advanced digital modes of communication.

Experimentation can be at many levels. One does not have to build the
technology up from the ground to use it or at least experiment with it
and see how well it works. Airtouch just announced that they're going
to provide Powerband service (their name for Qualcomm CDMA) at the
Republican Convention next week here in San Diego. And if your average
Republican can use spread spectrum, *anyone* can. :-)

>I think the idea that amateurs ever made any significant advances in radio
>technology is largely a myth. There's no way that your average ham, 60 or

Well, it's certainly true that the vast majority of hams have made no
significant advances in radio. But I strongly disagree with your
apparently absolute statement. Yes, many of the advances I attribute
to ham radio were in fact made in the commercial realm by people who
happened to have ham licenses. But even then, ham radio still deserves
at least some of the credit.

In my own case, I got my first ham license at age 14. I credit it with
steering me toward my career. Since graduation, I've managed to
maintain a symbiotic relationship between my ham radio and work
activities. And I'm finding this is fairly common among my colleagues
who are also hams. One of my company's founders, Klein Gilhousen
(WT6G) is fond of saying that "anything you do in ham radio you'll
probably find a use for at work within 6 months." I think I've
demonstrated that several times already. Some examples:

I came up with an improved TCP round trip timing mechanism largely as
a result of my experience in running TCP/IP over amateur packet radio.
It's now a required part of the TCP spec.

I (re)invented what became Bellcore's S/KEY one-time password scheme one night while visiting a fellow ham in NJ. I wanted to log back into my UNIX system at home without typing my password in the clear on 2m.

My NOS software has become the foundation of quite a few commercial dialup IP router packages. Etc.

There are other hams who could list similar accomplishments. Some of Franklin Antonio's graphics work in Instant Track went into the early Qualcomm Omnitrac's dispatch displays. Quite a few of the RF designers around here got their first exposure to this stuff through ham radio. Those who developed Clover, Pactor and the like have seen their systems used by non-amateur services. AMSAT's pioneering work in small LEO satellites is now spawning a whole new industry (which, ironically, is now threatening our spectrum :-()). And so on.

I think it's fair to say that this sort of stuff carries far more weight with the FCC than does DXing, ragchewing and contesting, even though only a small fraction of the amateur population is involved in the former. And that's one reason why the FCC has actually been trying to promote greater use of spread spectrum in the amateur service.

Phil

From lynnc@sos.net Wed Aug 07 21:49:02 1996
Received: from sos.sos.net (root@sos.sos.net [199.165.149.1]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id VAA10986 for <hfsig@tapr.org>; Wed, 7 Aug 1996 21:47:53 -0500 (CDT)
From: lynnc@sos.net
Received: from [199.165.149.203] (sos-dialup11.sos.net [199.165.149.203]) by sos.sos.net (8.6.12/8.6.9) with SMTP id UAA04838; Wed, 7 Aug 1996 20:04:43 -0700
Date: Wed, 7 Aug 1996 20:04:43 -0700
Message-Id: <199608080304.UAA04838@sos.sos.net>
MIME-Version: 1.0
Content-Type: text/plain
Content-Transfer-Encoding: 7bit
Subject: Re: [HFSIG:1472] Re: Amateur culture
To: hfsig@tapr.org, hfsig@tapr.org
In-Reply-To: <1.5.4.32.19960807211115.0067efd0@popmail.dircon.co.uk>
X-Mailer: SPRY Mail Version: 04.10.06.22

Well, blood boiling now, not a good time to enter feelings, but by gosh, we DID go from CW/AM to SSB and much, much more 60 (well, almost) years ago. Formal training was ARRL license manual, ARRL handbook, and perhaps for the more affluent, RADIO HANDBOOK.

Still in high-school and with cheering older hams around, we did create, innovate and build new and exciting stuff - - daily. We were probably not even average, and probably re-invented most things because technical knowledge didn't spread as fast and seamlessly as it does today. I'm darn proud of my "average" ham friends of the late 1940's and early 1950's--- W7KGV, W7LAN, W7LFA, W7FXD and hoards of others.

I was pretty slow, and didn't come up with my first junk-box SSB rig until 1960. Most of my friends had graduated to commercially built SSB gear by then, and were into home-brew VHF stuff from the high class surplus of the time.

There is a place for everyone in this mess, we had better stick together more tightly than in the past, as the benevolent public is beginning to look for more space, and the monitoring public would axe us in an instant if they hear the stuff for which we are using our precious bands. (not that the TV and cellular frequencies are a model to admire.)

but I digress----- Lynn, W7LTQ

From k4jppj@appstate.campus.mci.net Wed Aug 07 22:22:40 1996
Received: from appstate-01.campus.mci.net ([204.71.75.162]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id WAA12632 for <hfsig@tapr.org>; Wed, 7 Aug 1996 22:22:37 -0500 (CDT)
Received: from s25-pm02.appstate.campus.mci.net (s25-pm02.appstate.campus.mci.net [206.24.85.84]) by appstate-01.campus.mci.net (8.7.5/8.7.3) with SMTP id XAA10065 for <hfsig@tapr.org>; Wed, 7 Aug 1996 23:21:49 -0400 (EDT)
Message-Id: <199608080321.XAA10065@appstate-01.campus.mci.net>
X-Sender: k4jppj@appstate.campus.mci.net
X-Mailer: Windows Eudora Light Version 1.5.2
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 07 Aug 1996 23:21:45 -0400
To: hfsig@tapr.org
From: "Donald E. Haselwood" <k4jppj@appstate.campus.mci.net>
Subject: Re: [HFSIG:1457] Re: EVM56002 ?

At 06:49 AM 8/6/96 -0500, you wrote:

>Greg Jones wrote:

>

>> There is an opportunity for TAPR to do a group purchase on the Motorola
>> EVM56002 at a pretty low cost. Between 20 and 200 units would be the
>> goal...same price no matter how many are purchased. Figure about \$60 under
>> current commercial prices. No hard prices, because more work would have to
>> be done.

>>

>> Would there be interest in this in the HF SIG ? Especially since Johan's
>> code would run on it.

>

>Sounds great considering the price is already only \$149.95 at the
>Design-Net price page (<http://www2.motorola-dsp.com/dsp/home/net/pg.html>).

>

>They also offer a student discount of 20% reducing the price to \$120 + \$3
>shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)

>

>Mike N4CNW

>

>

If we are talking about less than \$100 count me in!

73's

Don, K4JPJ

From karn@qualcomm.com Wed Aug 07 23:38:49 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id XAA15749 for <hfsig@tapr.org>; Wed, 7 Aug 1996 23:38:47 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id VAA20197; Wed, 7 Aug 1996 21:38:15 -0700 (PDT)

Date: Wed, 7 Aug 1996 21:38:15 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608080438.VAA20197@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <208A69E0.1858@smtpgty.bwi.wec.com> (LANIER.R.A-@smtpgty.bwi.wec.com)

Subject: Re: [HFSIG:1469] Re: Wide band modes

> What is the name of the paper you are talking about here?

"Very Low Rate Convolutional Codes for Maximum Theoretical Performance of Spread-Spectrum Multiple-Access Channels", Andrew J. Viterbi, IEEE Journal on Selected Areas in Communications, Vol 8 No 4, May 1990, p 641.

Abstract - This paper treats a spread-spectrum multiple-access communication system for which both spreading and error control is provided by binary PSK modulation with orthogonal convolutional codes. Performance of spread spectrum multiple access by a large number of users employing this type of coded modulation is determined in the presence of background Gaussian noise. With this approach and coordinated processing at a common receiver, it is shown that the aggregate data rate of all simultaneous users can approach the Shannon capacity of the Gaussian noise channel.

From karn@qualcomm.com Thu Aug 08 03:52:51 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id DAA03247 for <hfsig@tapr.org>; Thu, 8 Aug 1996 03:52:50 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id BAA20871; Thu, 8 Aug 1996 01:52:18 -0700 (PDT)

Date: Thu, 8 Aug 1996 01:52:18 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608080852.BAA20871@servo.qualcomm.com>

To: hfsig@tapr.org

Subject: New RF safety standards

Some of you may have just heard that the FCC has adopted new and more stringent rules regarding RF emission safety, and these rules do NOT exempt amateurs as they have in the past.

See <http://www.arrl.org/news/rfsafety> for details.

It does occur to me that this might be the impetus the amateur service needs to finally get serious about using the minimum power required to maintain communications. It may even spark interest in newer, more

power-efficient modulation methods -- even if they need more power.

And who knows? We might even find our TVI/RFI problems reduced too.

Phil

From wd6ehr@kaiwan009.kaiwan.com Thu Aug 08 04:06:03 1996

Received: from kaiwan009.kaiwan.com (kaiwan009.kaiwan.com [198.178.203.9]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id EAA03621 for <hfsig@tapr.org>; Thu, 8 Aug 1996 04:06:01 -0500 (CDT)

Received: (from wd6ehr@localhost) by kaiwan009.kaiwan.com (8.7.3/8.7.3) id CAA18844 for hfsig@tapr.org; Thu, 8 Aug 1996 02:05:58 -0700 (PDT)

*** KAIWAN Internet ***

From: Mike Curtis <wd6ehr@kaiwan009.kaiwan.com>

Message-Id: <199608080905.CAA18844@kaiwan009.kaiwan.com>

Subject: Re: [HFSIG:1473] Re: Amateur culture

To: hfsig@tapr.org

Date: Thu, 8 Aug 1996 02:05:57 -0700 (PDT)

In-Reply-To: <199608080102.SAA19732@servo.qualcomm.com> from "Phil Karn" at Aug 7, 96 08:09:18 pm

X-Mailer: ELM [version 2.4 PL22]

MIME-Version: 1.0

Content-Type: text/plain; charset=US-ASCII

Content-Transfer-Encoding: 7bit

>

> >1. Without those 99.9999%, the remaining .0001% would not have *any*
> >spectrum to experiment in at all.

> I think it's fair to say that this sort of stuff carries far more
> weight with the FCC than does DXing, ragchewing and contesting, even
> though only a small fraction of the amateur population is involved in
> the former. And that's one reason why the FCC has actually been trying
> to promote greater use of spread spectrum in the amateur service.

One big problem I see with amateur radio is that the cart has been put before the horse. The "99.9999%" has made it quite difficult for the innovators to experiment. Yet innovation is a major portion of the cornerstone of amateur radio. In areas like Los Angeles, it is doggone nearly impossible to experiment on popular bands such as 2 meters and open HF bands. 220 is better, but only because laws were changed that MANDATED setting aside spectrum for "weak signal" stuff. We have old, established technologies putting ironclad claims on most of the spectrum, and this is IMHO exacerbated by actually encouraging prospective hams to memorize by rote the test answers. Yes I know we live in the age of instant gratification. I just think it's inherently evil.

-- mike

From karn@qualcomm.com Thu Aug 08 04:31:20 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id EAA04293 for <hfsig@tapr.org>; Thu, 8 Aug 1996 04:31:19 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id CAA20982; Thu, 8 Aug 1996 02:30:47 -0700 (PDT)

Date: Thu, 8 Aug 1996 02:30:47 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608080930.CAA20982@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <199608060035.RAA13794@ravel.n2.net> (k6sti@n2.net)

Subject: Re: [HFSIG:1448] How much QRM is too much?

>For someone trying to copy a signal right at the thermal, cosmic, or
>atmospheric noise level, any interference is appreciable. For some hams

"Any" is a rather absolute term; it reminds me of the absolutist position on biological radiation exposure (no artificial radiation whatsoever is tolerable even though the natural background can vary substantially). But unlike that particular can of worms, the math here is not too hard.

I've been meaning to work out the exact figures for how long an observing interval is required to even detect a certain small change in the noise floor with a certain confidence. Tom Clark (W3IWI) does essentially this kind of calculation all the time in radio astronomy, where all the signals he observes are essentially noise (at least until the first positive SETI acquisition). He sketched out the basic principles for me over lunch a while ago. Once I translated it from "radio astronomerese" into "communicationese" I realized it was all the same math I'm used to seeing in comm theory.

Qualitatively, the minimum required observing interval depends on both the difference in noise level (larger differences can be detected more quickly) and the observation bandwidth (detection is quicker with larger observation bandwidths -- so the obsession with narrowband receivers works to my advantage here! :-))

Phil

From Robert.Glassey@nmp.nokia.com Thu Aug 08 05:17:42 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id FAA05700 for <hfsig@tapr.org>; Thu, 8 Aug 1996 05:17:37 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id NAA08736 for <hfsig@tapr.org>; Thu, 8 Aug 1996 13:16:32 +0300

Received: from by samail01.nmp.nokia.com with SMTP

(1.37.109.16/16.2) id AA159949130; Thu, 8 Aug 1996 13:12:11 +0300

X-Openmail-Hops: 2

Date: Thu, 8 Aug 96 11:13:03 +0100

Message-Id: <H000029202318a16@MHS>

In-Reply-To: <199608080102.SAA19732@servo.qualcomm.com>

Subject: [HFSIG:1473] Re: Amateur culture
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

Hi Phil,

> I think it's fair to say that this sort of stuff carries far more
> weight with the FCC than does DXing, ragchewing and contesting, even
> though only a small fraction of the amateur population is involved in
> the former.

Yip, I agree, but the 'DXing, ragchewing and contesting' and the likes
is where it all starts, and is what keeps it alive in the general
population. If amateur radio was only the 0.0001% expert experimenters I
would have probably never heard of it, and neither would most of the
0.0001%.

'Technological stamp collecting' is in my opinion an essential part of
amateur radio, not to be lightly disregarded.

> And that's one reason why the FCC has actually been trying
> to promote greater use of spread spectrum in the amateur service.

I would hope the FCC is doing this with a wider view of amateur radio,
or does it intend to promote the amateur bands as a test bed for
commercial experimentation, rather than for more personal radio
experiments? Is this how it is justifying an 'amateur' allocation in a
commercial enviroment?

This issue caused a bit of controvercy in New Zealand when a number of
hams with commercial interests started using ham bands for commercial
experimenation, although not blatantly. Others saw it as a usefull
contribution to amateur radio. I wouldn't like to say, it sure is on the
fine line between 'advanceing the art' and 'pecuniary interest'.

Certainly, that line is overstepped when 'pecuniary interest' takes
presidence over other legitimate uses of the bands. (thinking more of
the FCC here)

Rob

From k5yfw@www.kelly-afb.org Thu Aug 08 09:07:00 1996
Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org
(8.7.5/8.7.3/1.9) with ESMTP id JAA15306 for <hfsig@tapr.org>; Thu, 8 Aug 1996
09:06:57 -0500 (CDT)
Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id JAA22454
for hfsig@tapr.org; Thu, 8 Aug 1996 09:07:38 -0500 (CDT)
From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
Message-Id: <199608081407.JAA22454@www.kelly-afb.org>
Subject: Re: [HFSIG:1480] Re: Amateur culture
To: hfsig@tapr.org
Date: Thu, 8 Aug 1996 09:07:37 -0500 (CDT)

In-Reply-To: <H000029202318a16@MHS> from "Robert.Glassey@nmp.nokia.com" at Aug 8,
96 05:21:28 am
Reply-To: k5yfw@www.kelly-afb.org
X-Mailer: ELM [version 2.4 PL24]
Content-Type: text

Rob,

In your message you write:

[Stuff Deleted]

>

> This issue caused a bit of controvercy in New Zealand when a number of
> hams with commercial interests started using ham bands for commercial
> experimenation, although not blatently. Others saw it as a usefull
> contribution to amateur radio. I wouldn't like to say, it sure is on the
> fine line between 'advanceing the art' and 'pecuniary interest'.

>

> Certianly, that line is overstepped when 'pecuniary interest' takes
> presidence over other legitimate uses of the bands. (thinking more of
> the FCC here)

>

>

> Rob

>

>

In past years, educational institutions used hambands extensively for education/training. Many high schools had ham radio as in part of the "shop" program and most electronic technical schools also used ham radio as a teaching tool. While I don't think that colleges and/or universities used ham radio as a tool at the undergraduate level, I know that is was used in lab work for post-graduate degrees. And I have to admit that I believe in most cases high schools, technical schools and colleges/universities were not too concerned whether or not a student had a ham radio license as long as there was a ham present in the "lab".

Also, I know of three specific instances where the FCC has granted licenses to commecial businesses to operate in the hambands...granted there were frequency restrictions, and special licenses...even restrictions on who the stations could talk with...in some instances, they were issued special callsigns, other times regular ham callsigns. These stations were licensed to do experimental and/or production unit field test.

What's new?

Walt/K5YFW

=====
| The MicroSoft operating system didn't get as bad as it is overnight,|
| it has taken over 10 years of careful, calculated development. |

```

=====
|                               |                               |
|                               | The greatest dangers to liberty |
| Walt DuBose - K5YFW         | lurk in insidious encroachment |
| E-Mail k5yfw@www.kelly-afb.org | by men of zeal, well-meaning   |
| Business Telephone: (210)925-6081 | but without understanding.      |
| Home Telephone: (210)696-3196 |                               |
|                               | - Justice Louis D. Brandeis    |
|                               |                               |
=====

```

From k5yfw@www.kelly-afb.org Thu Aug 08 09:10:31 1996
 Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org
 (8.7.5/8.7.3/1.9) with ESMTP id JAA15620 for <hfsig@tapr.org>; Thu, 8 Aug 1996
 09:10:29 -0500 (CDT)
 Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id JAA22482
 for hfsig@tapr.org; Thu, 8 Aug 1996 09:11:10 -0500 (CDT)
 From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>
 Message-Id: <199608081411.JAA22482@www.kelly-afb.org>
 Subject: Re: [HFSIG:1478] Re: Amateur culture
 To: hfsig@tapr.org
 Date: Thu, 8 Aug 1996 09:11:10 -0500 (CDT)
 In-Reply-To: <199608080905.CAA18844@kaiwan009.kaiwan.com> from "Mike Curtis" at
 Aug 8, 96 04:07:19 am
 Reply-To: k5yfw@www.kelly-afb.org
 X-Mailer: ELM [version 2.4 PL24]
 Content-Type: text

In your message you write:

[Stuff Deleted]

>

> One big problem I see with amateur radio is that the cart has been put
 > before the horse.

The horse has got to go...the horse is old technology and the
 droppings are causing a mal-odor in our hobby. -- Walt/K5YFW

From Robert.Glassey@nmp.nokia.com Thu Aug 08 10:27:20 1996
 Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org
 (8.7.5/8.7.3/1.9) with SMTP id KAA20172 for <hfsig@tapr.org>; Thu, 8 Aug 1996
 10:27:17 -0500 (CDT)
 From: Robert.Glassey@nmp.nokia.com
 Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by
 noknic.nokia.com (8.6.9/8.6.9) with ESMTP id SAA28936; Thu, 8 Aug 1996 18:26:07
 +0300
 Received: from by samail01.nmp.nokia.com with SMTP
 (1.37.109.16/16.2) id AA170947746; Thu, 8 Aug 1996 18:22:26 +0300
 X-Openmail-Hops: 2
 Date: Thu, 8 Aug 96 16:23:14 +0100
 Message-Id: <H000029202323446@MHS>
 In-Reply-To: <199608081407.JAA22454@www.kelly-afb.org>
 Subject: [HFSIG:1481] Re: Amateur culture

Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org, k5yfw@www.kelly-afb.org

> In past years, educational institutions used hambands extensively
> for education/training. Many high schools had ham radio as in part

Granted, and I support such activities, such as JOTA etc. This is well
in the spirit of amateur radio.

> Also, I know of three specific instances where the FCC has granted
> licenses to commercial businesses to operate in the hambands...granted
> there were frequency restrictions, and special licenses...even
> restrictions on who the stations could talk with...in some instances,
> they were issued special callsigns, other times regular ham
> callsigns. These stations were licensed to do experimental and/or
> production unit field test.

I'm sure there are cases where such commercial use is justified, and I
never said I opposed the semi-commercial experimentation in New Zealand
(they did not have special commercial licences), I'm just wondering
about the fine line between commercialisation of the ham bands and the
advancement of technology. International treaties specifically exclude
'pecuniary interest' in amateur radio. I'm wondering if perhaps the FCC
are promoting commercial interests **over_and_above** the interests of all
amateurs, and possibly against the International Radio Regulations.
Perhaps the FCC see the amateur bands as more for experimentation for
the advancement of commercial technology, rather than for the self
training of amateurs as specified in the international regulations.

Commercial enterprises can still experiment on other bands with other
licences, but they cost more money than the ham bands. The
non-commercial nature of amateur radio works too ways, to protect
industry from amateurs exploiting their allocations commercially, and to
protect amateurs from commercial organisations trying to exploit a cheap
resource to the detriment of amateurs, and their self training.

I was wonder if this is why they appear to support spread spectrum (an
emerging commercial technology) on HF, apparently disregarding the
interests of the majority of amateurs.

Rob

From forrerj@peak.org Thu Aug 08 12:29:52 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id MAA26559 for <HFSIG@TAPR.ORG>; Thu, 8 Aug 1996
12:29:48 -0500 (CDT)
Received: from p05.t0.monrotel.com (p01.t0.monrotel.com [198.68.25.34]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id KAA23715 for <HFSIG@TAPR.ORG>; Thu, 8 Aug
1996 10:29:47 -0700
Message-Id: <199608081729.KAA23715@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0

Content-Type: text/plain; charset="us-ascii"
Date: Thu, 08 Aug 1996 10:18:45 -0800
To: HFSIG@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: New floating point EVM from TI

Hi All,

Those interested in dabbling with DSP hardware; TI's new 320C31 DSK is finally available. Marshall (1-800-522-0084) has them at a special introductory price of \$79.

This is a FLOATING POINT DSP chip. I'm not sure about the clock speed, CODEC, or how much memory the DSK has, but I'll let you know when I receive mine.

I have a small collection of software tools for this DSP and am particularly interested in the floating point architecture for implementing FFT demodulators where the extra dynamic range is essential.

Exciting times - there also is some other interesting developments from Motorola that I'll tell you more about in the near future.

--Johan, KC7WW

From rhiii@pop.erols.com Thu Aug 08 13:17:58 1996
Received: from smtp2.erols.com (root@smtp2.erols.com [205.252.116.102]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id NAA28357 for <hfsig@tapr.org>; Thu, 8 Aug 1996 13:17:56 -0500 (CDT)
Received: from war-as1s53.erols.com (war-as1s53.erols.com [206.161.188.53]) by smtp2.erols.com (8.7.3/8.6.5) with SMTP id OAA29197 for <hfsig@tapr.org>; Thu, 8 Aug 1996 14:17:53 -0400 (EDT)
From: rhiii@pop.erols.com (Richard H)
To: hfsig@tapr.org
Subject: RE: EVM56002 ?
Date: Thu, 08 Aug 1996 18:17:00 GMT
Message-ID: <320a2920.44799027@smtp.erols.com>
References: <01BB847C.8A8E18C0@csa106.emirates.net.ae>
In-Reply-To: <01BB847C.8A8E18C0@csa106.emirates.net.ae>
X-Mailer: Forte Agent .99e/16.227

Question to those familiar with this kit.

What is the knowledge entry level for this DSP kit ? Does it assume

the student already be fluent in FFT, Z and LaPlace transforms. Can this be considered a "First" DSP learning kit or is it targeted towards the practicing dsp engineer ?

Thanks,
de Richard/N2JR

From karn@qualcomm.com Thu Aug 08 14:31:54 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id 0AA01413 for <hfsig@tapr.org>; Thu, 8 Aug 1996 14:31:52 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id MAA14708; Thu, 8 Aug 1996 12:31:19 -0700 (PDT)
Date: Thu, 8 Aug 1996 12:31:19 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608081931.MAA14708@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <H000029202318a16@MHS> (Robert.Glassey@nmp.nokia.com)
Subject: Re: [HFSIG:1480] Re: Amateur culture

>I would hope the FCC is doing this with a wider view of amateur radio,
>or does it intend to promote the amateur bands as a test bed for
>commercial experimentation, rather than for more personal radio
>experiments? Is this how it is justifying an 'amateur' allocation in a
>commercial enviroment?

Amateur radio has never existed in a vacuum. Although direct commercial exploitation is not allowed, it has always been one of the goals of the amateur service to develop technology and to train engineers and radio operators who can then benefit commercial and government activities. It's a win-win situation. Not only does that create new technology for our use, but it earns lots of brownie points for ham radio.

I believe "commercial exploitation" should be narrowly defined as selling a public communication service for profit. Developing new technology on the ham bands that may then be commercialized is in itself perfectly legitimate, although I am concerned by the recent trend towards keeping such technology proprietary.

Phil

From mwestfal@csci.csusb.edu Thu Aug 08 18:44:31 1996
Received: from silicon.csci.csusb.edu (silicon.csci.csusb.edu [139.182.38.1]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id SAA13030 for <hfsig@tapr.org>; Thu, 8 Aug 1996 18:44:29 -0500 (CDT)
Received: by silicon.csci.csusb.edu (5.0/SMI-SVR4) id AA16140; Thu, 8 Aug 1996 17:00:18 +0800
From: mwestfal@csci.csusb.edu (Michael Westfall)
Received: by csci.csusb.edu id QAA22063; Thu, 8 Aug 1996 16:46:35 -0700 (PDT) (8.7.1 Berkeley Sendmail)
Message-Id: <199608082346.QAA22063@csci.csusb.edu>
Subject: Re: [HFSIG:1482] Re: Amateur culture

To: hfsig@tapr.org
Date: Thu, 8 Aug 1996 16:46:35 -0700 (PDT)
In-Reply-To: <199608081411.JAA22482@www.kelly-afb.org> from "Walt DuBose - K5YFW"
at Aug 8, 96 09:23:27 am
Reply-To: mwestfal@csci.csusb.edu
X-Hi-Mom: Send more money!
Organization: The Hackers' Guild
X-Mailer: ELM [version 2.4 PL20]
Mime-Version: 1.0
Content-Type: text/plain; charset=US-ASCII
Content-Transfer-Encoding: 7bit

> > One big problem I see with amateur radio is that the cart has been put
> > before the horse.
>
>
> The horse has got to go...the horse is old technology and the
> droppings are causing a mal-odor in our hobby. -- Walt/K5YFW

"The warp-drive thrusters have been put before the starship" ???
>
>

--

73 de Mike "They call me 'MiKUY'", N6KUY
ax.25net: N6KUY@W6JBT.#SOCA.CA.USA.NOAM
internet: mwestfal@csci.csusb.edu
web: <http://web.csusb.edu/public/csci/mwestfal>
Linux: the Gates of Hell shall not prevail.

From forrerj@peak.org Thu Aug 08 21:46:14 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id VAA22829 for <hfsig@tapr.org>; Thu, 8 Aug 1996
21:46:07 -0500 (CDT)
Received: from p06.t0.monrotel.com (p06.t0.monrotel.com [198.68.25.39]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id TAA26420 for <hfsig@tapr.org>; Thu, 8 Aug
1996 19:46:21 -0700
Message-Id: <199608090246.TAA26420@PEAK.ORG>
X-Sender: forrerj@peak.org
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Thu, 08 Aug 1996 19:35:18 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1485] RE: EVM56002 ?

Richard,

>Question to those familiar with this kit.

>

>What is the knowledge entry level for this DSP kit ? Does it assume
>the student already be fluent in FFT, Z and LaPlace transforms.

Not quite a requirement, but that surely comes in handy. Without that, you should consider joining a support group where you can share the experiences of others. In time you will broaden you horizon and the formiddable math

will become a lot of fun.

Since you already know the buzz words, I would say that you are well on your way.

>Can this be considered a "First" DSP learning kit or is it targeted towards
>the practicing dsp engineer ?

>

>Thanks,

>de Richard/N2JR

>

>

There are of course ways to learn about DSP without having DSP hardware, i.e., PC program packages. However, if you are in a position where you would like to use DSP hardware in your experiments or your career track, the EVM's are often the key to getting started. That goes for engineers or scientific minds. It does take a combination of some skill, level of interest, persistence, and intuition to tame the little beastly.

Hope this helps.

--Johan

From k5yfw@www.kelly-afb.org Fri Aug 09 07:48:38 1996

Received: from www.kelly-afb.org (www.kelly-afb.org [204.214.204.10]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id HAA19453 for <hfsig@tapr.org>; Fri, 9 Aug 1996 07:48:36 -0500 (CDT)

Received: (from k5yfw@localhost) by www.kelly-afb.org (8.7.1/8.7.1) id HAA03844; Fri, 9 Aug 1996 07:49:17 -0500 (CDT)

From: Walt DuBose - K5YFW <k5yfw@www.kelly-afb.org>

Message-Id: <199608091249.HAA03844@www.kelly-afb.org>

Subject: Re: [HFSIG:1487] Re: Amateur culture

To: hfsig@tapr.org

Date: Fri, 9 Aug 1996 07:49:17 -0500 (CDT)

Cc: karn@qualcomm.com, choffman@pelican.davlin.net (Ric Hoffman),

forrerj@frl.orst.edu (Johan Forrier)

In-Reply-To: <199608082346.QAA22063@csci.csusb.edu> from "Michael Westfall" at Aug 8, 96 06:57:37 pm

Reply-To: k5yfw@www.kelly-afb.org

X-Mailer: ELM [version 2.4 PL24]

Content-Type: text

Mike,

In your message you write:

>
> > > One big problem I see with amateur radio is that the cart has been put
> > > before the horse.
> >
> >
> > The horse has got to go...the horse is old technology and the
> > droppings are causing a mal-odor in our hobby. -- Walt/K5YFW
>
>
> "The warp-drive thrusters have been put before the starship" ???
> >
> >

That's a perfectly acceptable practice as long as you
SPREAD THEM. -- Walt/K5YFW

>
>
> --
>
> -----
> 73 de Mike "They call me 'MiKUY'", N6KUY
> ax.25net: N6KUY@W6JBT.#SOCA.CA.USA.NOAM
> internet: mwestfal@csci.csusb.edu
> web: http://web.csusb.edu/public/csci/mwestfal
> Linux: the Gates of Hell shall not prevail.
> -----
>
>

--

=====

The MicroSoft operating system didn't get as bad as it is overnight,	
it has taken over 10 years of careful, calculated development.	

=====

		The greatest dangers to liberty
Walt DuBose - K5YFW		lurk in insidious encroachment
E-Mail k5yfw@www.kelly-afb.org		by men of zeal, well-meaning

Business Telephone: (210)925-6081	but without understanding.
Home Telephone: (210)696-3196	
	- Justice Louis D. Brandeis

=====

From zs6awk@global.co.za Fri Aug 09 10:06:26 1996
Received: from lin01.global.co.za (lin01.global.co.za [196.3.164.2]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id KAA25018 for <hfsig@tapr.org>; Fri, 9 Aug 1996 10:06:14 -0500 (CDT)
Received: from anx_pt_5.global.co.za (anx_pt_5.global.co.za [196.3.165.205]) by lin01.global.co.za (8.7.3/8.7.3) with SMTP id RAA07706 for <hfsig@tapr.org>; Fri, 9 Aug 1996 17:04:53 -0200 (GMT)
Message-Id: <199608091904.RAA07706@lin01.global.co.za>
X-Sender: zs6awk@mail.global.co.za
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 09 Aug 1996 17:07:15 +0200
To: hfsig@tapr.org
From: zs6awk@global.co.za (Danie Brynard)
Subject: new C31 EVM ?

Did anyone play with the new TMS320C31 EVM yet ? How usefull is it for ham radio datacomms experiemnts ? Can one 'flash' applications ? Async Serial Ports ?

Danie
zs6awk@global.co.za

From forrerj@peak.org Fri Aug 09 11:33:29 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id LAA28811 for <HFSIG@TAPR.ORG>; Fri, 9 Aug 1996 11:33:27 -0500 (CDT)
Received: from p04.t0.monrotel.com (p04.t0.monrotel.com [198.68.25.37]) by PEAK.ORG (8.6.13/8.6.7) with SMTP id JAA20720 for <HFSIG@TAPR.ORG>; Fri, 9 Aug 1996 09:33:44 -0700
Message-Id: <199608091633.JAA20720@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 09 Aug 1996 09:22:46 -0800
To: HFSIG@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: ECC for SHORT data block

Hi Experts,

I wonder what a suitable ECC code would be for a short bit field such as

32-bits.

It need to detect and correct at least six bits. Further, need to have a fast algorithm to compute syndromes and error locations, if it could be done using a table lookup, that would be great.

The field and ECC code is for the header field following the sync vector in my new scheme. I was thinking of using a BCH code.

Any further suggestions?

--Johan, KC7WW

From Robert.Glassey@nmp.nokia.com Fri Aug 09 11:55:32 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id LAA00305 for <hfsig@tapr.org>; Fri, 9 Aug 1996 11:55:30 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id TAA12783 for <hfsig@tapr.org>; Fri, 9 Aug 1996 19:54:53 +0300

Received: from by samail01.nmp.nokia.com with SMTP (1.37.109.16/16.2) id AA241649469; Fri, 9 Aug 1996 19:51:09 +0300

X-Openmail-Hops: 2

Date: Fri, 9 Aug 96 17:52:07 +0100

Message-Id: <H00002920234821f@MHS>

Subject: FTP mail archive?

Mime-Version: 1.0

To: hfsig@tapr.org

Content-Type: text/plain; charset=ISO-8859-1; name="FTP"

Content-Transfer-Encoding: 7bit

Hi

I was wondering what has happended to the mail archive on the TAPR FTP site? It seems to have stopped in June.

Cheers,

Rob

From rhiii@pop.erols.com Fri Aug 09 13:39:29 1996

Received: from smtp2.erols.com (root@smtp2.erols.com [205.252.116.102]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id NAA06241 for <hfsig@tapr.org>; Fri, 9 Aug 1996 13:39:27 -0500 (CDT)

Received: from LOCALNAME (war-as1s29.erols.com [206.161.188.29]) by smtp2.erols.com (8.7.3/8.6.5) with SMTP id OAA21921 for <hfsig@tapr.org>; Fri, 9 Aug 1996 14:39:24 -0400 (EDT)

Message-ID: <320B4BB8.6A67@pop.erols.com>

Date: Fri, 09 Aug 1996 07:31:20 -0700

From: Richard Harrison <rhiii@pop.erols.com>

X-Mailer: Mozilla 2.0 (Win16; U)

MIME-Version: 1.0

To: hfsig@tapr.org
Subject: Re: [HFSIG:1488] RE: EVM56002 ?
References: <199608090246.TAA26420@PEAK.ORG>
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Thank you Johan for taking the time to respond. Taking all of your comments under advisement, will order the EVM56002 and begin the journey towards understanding these new technical building blocks.

I am an EE but it has been quite a while since I've had to work with integro-differential equations and their associated transforms.

Regards,

de Richard/N2JR

From k6sti@n2.net Fri Aug 09 14:52:31 1996
Received: from ravel.n2.net (rael.n2.net [204.250.22.20]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id OAA09620 for <hfsig@tapr.org>; Fri, 9 Aug 1996 14:52:28 -0500 (CDT)
Received: from ppp169.n2.net (ppp169.n2.net [204.250.22.169]) by ravel.n2.net (8.6.12/8.6.12) with SMTP id MAA11031; Fri, 9 Aug 1996 12:52:18 -0700
Date: Fri, 9 Aug 1996 12:52:18 -0700
Message-Id: <199608091952.MAA11031@rael.n2.net>
X-Sender: k6sti@mail.n2.net
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
To: cq-contest@tgv.com, moon-net@vm.stlawu.edu, hfsig@tapr.org, wf1b-rtty@ve7tcp@ampr.org
From: k6sti@n2.net (Brian Beezley)
Subject: Free Near-Field Analysis Software

As a result of the recent FCC ruling that mandates RF-exposure limits for amateur stations beginning January 1, 1997, I'm making available at no cost a special version of AO Antenna Optimizer software that calculates electric and magnetic near fields. NF.EXE requires a 386 or better, math coprocessor, VGA, and DOS 3.0 or later.

You can download the 245K NF.ZIP file from ftp://n6nd.nosc.mil. You may copy this free software for others as long as no charge is involved and the software is used for amateur purposes only.

After you unzip the file, see READ.ME for more information. Please carefully read the section on accuracy limitations of near-field modeling.

I hope this software helps hams evaluate their stations for compliance with the new FCC rule. The software should be especially useful at high-power contest, DX, and EME stations.

I'm providing this free software without support. The package includes

extensive documentation and 92 example antenna files. I hope you'll refrain from calling, writing, or e-mailing questions about downloading or using the software. Thanks!

Brian Beezley, K6STI
k6sti@n2.net

From forrerj@peak.org Mon Aug 12 22:27:17 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id WAA14273 for <HFSIG@TAPR.ORG>; Mon, 12 Aug 1996 22:27:05 -0500 (CDT)
Received: from p05.t0.monrotel.com (p01.t0.monrotel.com [198.68.25.34]) by PEAK.ORG (8.6.13/8.6.7) with SMTP id UAA28713 for <HFSIG@TAPR.ORG>; Mon, 12 Aug 1996 20:27:21 -0700
Message-Id: <199608130327.UAA28713@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Mon, 12 Aug 1996 20:17:06 -0800
To: HFSIG@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: FTP Packet Driver Specification

Hi,

I would be grateful if someone could point me to the location of the "FTP packet driver specification". I have a suspicion that it may be somewhere at Clarkson, but was not able to locate it.

This is to be used to connect a new HF DSP modem a TCP/IP environment. I do have most of the low-level code sorted out, but miss the documentation to understand what is needed to interface to the network OS.

Thanks much.

--Johan, KC7WW

From lay@cod.nosc.mil Tue Aug 13 09:50:43 1996
Received: from trout.nosc.mil (trout.nosc.mil [128.49.16.7]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id JAA17903 for <hfsig@tapr.org>; Tue, 13 Aug 1996 09:50:41 -0500 (CDT)
Received: from marlin.nosc.mil by trout.nosc.mil (4.1/SMI-4.1) id AA28700; Tue, 13 Aug 96 07:50:38 PDT
Received: from sam.nosc.mil by marlin.nosc.mil (4.1/SMI-4.1) id AA23849; Tue, 13 Aug 96 07:49:53 PDT
Message-Id: <32108763.7EDA@cod.nosc.mil>
Date: Tue, 13 Aug 1996 06:47:15 -0700
From: Richard Lay <lay@cod.nosc.mil>
Organization: NRaD
X-Mailer: Mozilla 2.02 (Win16; I)
Mime-Version: 1.0

Newsgroups: sci.stat.math,rec.puzzles,rec.gambling.misc,sci.math
Cc: hfsig@tapr.org, lay@cod.nosc.mil
Subject: SUMMARY- *at least* Y *in a row* probability question
Content-Type: text/plain; charset=us-ascii
Content-Transfer-Encoding: 7bit

Thanks to all that helped me with my probability question. I know much more about the problem now. Special thanks to Tim Firman, who spent much time on the problem and answering my questions. I also thank Jim Landis, whose solution appears first below. His is the one I implemented both in C (recursive and non-recursive forms) and MATHCAD (non-recursive only). If anyone would like a copy of either of these please let me know. And finally, Ken Butler went at the problem from a different point of view. I have only just received his solution, but it looks interesting, and I post it as it approaches the problem from another prospective. I received many more replies besides these. Thanks to all who responded. You are the ones who make the internet such a valuable resource.

Regards,
Rich Lay

Original question:

If the probability of an individual event occurring (heads on a coin, 3 on a die, an error in a received ALE word) is P, then within a sequence of S events (S coin flips/die rolls/ALE words received), what is the probability that *at least* Y of these events will occur *in a row* ?

Jim Landis solution:

I have a solution that is a little heavy in computation, but it does solve the problem exactly, with out double counting or miscounting any cases.

I don't know of any simple solution to that problem in "closed" notation, but it yields very easily to a recursive formula, i.e. a formula defined in terms of itself.

Define $f(n, Y, S, p)$ as follows :

$f(0, Y, S, p) = 1$

$f(n, Y, S, p) = 0$ for all $n > S \geq 0$

$f(n, Y, S, p) = p*f(n-1, Y, S-1, p) + (1-p)*f(Y, Y, S-1, p)$

n represents the number of successes needed to complete the current

"streak", and should initially be set to Y

Y represents the total number of successes needed in a row

S is the number of remaining trials

p is the probability of success on any trial

$f()$ could be interpreted as "the probability that you will have a streak of n successes immediately, or a streak of Y successes later on". The two terms evaluate the remaining probability after each roll of the die. First term corresponds to success on the current roll, the

second term to failure.

So the probability of an unbroken string of four 3's in 20 rolls of a fair die is $f(4,4,20, 1/6)$ or approximately 0.011026 .

You can verify that $Y=1, S=1$ yields a probability p , as you would expect. You can also verify that $Y=S$ yields p^S .

This can be implemented in a simple computer program. However, because of the double recursion, the run time of the program is $O(2^{(S-Y)})$. The formula is essentially called once for each of the 2 to the power of S outcomes. For $S=20$, that is more than a million times. Beyond $S = 30$ or so, that approach is so slow as to be impractical.

A non-recursive program could be written based on an $S+1$ by $Y+1$ array of values, and running in time $O((S*Y)^2)$. The approach would be to create an array. Initialize one column of the array to value 1, based on the first rule. Initialize one half of the array to 0, as per the second rule. Every remaining cell of the array can be calculated from 2 other cells by the function definition.

Ken Butler solution:

Anyway, assuming that independence and constant probability are OK here, my line of thinking is the following: let N be the total number of words sent when Y consecutive words are received incorrectly for the first time. For example, if $Y=3$, in the following sequence of words sent (C = correctly received, I = incorrect):

I C I I C C I I I

$N = 9$, since 9 words have been sent by the time the 3rd consecutive I appears. Relating this to your problem, if $N > S$, then the radios link up, whereas if $N \leq S$, the link is disestablished. So $\text{prob}(N > S)$ is the probability you want. (This takes care of the "at least" problem, because once Y consecutive I 's show up, we stop looking.) You also see that the last four ($=Y+1$) words sent are a C followed by K I 's; this must be the way the process stops, because if we'd gotten any more consecutive I 's, we would have stopped earlier, and if we'd gotten any fewer, we'd keep looking.)

To show what happens with $Y=2$:

N cannot be 0 or 1;

$N = 2$ if we get $I I$, whose probability is P^2 .

$N = 3$ if we get $C I I$, with prob. $(1-P)*P^2$.

$N = 4$ if we get $I C I I$ or $C C I I$, ie. the last 3 are $C I I$ no matter what

the first is. Probability is $(1-P)*P^2$ as for $N=3$.

Then, a pattern:

```
N = 5 if we survive the first 2 words and then get C I I;
N = 6 if                                     3           C I I;
..
..
N = m if                                     m-3           C I I,
```

so that $\text{prob}(N = m) = \text{prob}(N > m-3) * (1-P) * P^2$.

Overall, the probability is 0 for a bit, P^2 once, $(1-P)*P^2$ for a bit, and then the above relationship holds. This was for $Y=2$, but the same idea generalizes to other Y :

```
Prob(N = m) = :  0 if m < Y-1
                  P^Y if m = Y
                  (1-P) * P^Y * prob(N > m-Y-1) if m > Y.
```

Because each probability depends on previous ones, you'll need to calculate these probabilities one at a time, starting from 0 (or Y) and continuing up to S . It's probably easiest to keep track of $\text{prob}(N > m)$, since this is the quantity of interest anyway, noting that $\text{prob}(N > m) = \text{prob}(N > m-1) - \text{prob}(N = m)$, and $\text{prob}(N > 0) = 0$.

```
From Robert.Glassey@nmp.nokia.com Tue Aug 13 12:01:59 1996
Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id MAA22456 for <hfsig@tapr.org>; Tue, 13 Aug 1996
12:01:58 -0500 (CDT)
From: Robert.Glassey@nmp.nokia.com
Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by
noknic.nokia.com (8.6.9/8.6.9) with ESMTP id UAA07021 for <hfsig@tapr.org>; Tue,
13 Aug 1996 20:01:21 +0300
Received: from by samail01.nmp.nokia.com with SMTP
(1.37.109.16/16.2) id AA055235449; Tue, 13 Aug 1996 19:57:30 +0300
X-Openmail-Hops: 2
Date: Tue, 13 Aug 96 17:58:42 +0100
Message-Id: <H00002920238df82@MHS>
In-Reply-To: <199608130327.UAA28713@PEAK.ORG>
Subject: New modem
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org
```

```
> This is to be used to connect a new HF DSP modem a TCP/IP environment.
> I do have most of the low-level code sorted out, but miss the
> documentation to understand what is needed to interface to the network
> OS.
```

Hi Johan,

I wonder how you are getting on with your new modem. Perhaps you would like to post a brief description of it to the group.

I gather it uses two independent tones with PSK, or is this a multi tone OFDM or MFSK modem?

Cheers,

Rob

From forrerj@peak.org Tue Aug 13 16:10:56 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id QAA03350 for <hfsig@tapr.org>; Tue, 13 Aug 1996 16:10:54 -0500 (CDT)
Received: from p06.t0.monrotel.com (p00.t0.monrotel.com [198.68.25.33]) by PEAK.ORG (8.6.13/8.6.7) with SMTP id OAA00166 for <hfsig@tapr.org>; Tue, 13 Aug 1996 14:11:06 -0700
Message-Id: <199608132111.OAA00166@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 13 Aug 1996 14:00:50 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1497] New modem

Hi Rob,

>I wonder how you are getting on with your new modem. Perhaps you would
>like to post a brief description of it to the group.
>
>I gather it uses two independent tones with PSK, or is this a multi tone
>OFDM or MFSK modem?
>
>Cheers,
>
>Rob
>
>

Sorry that I have not posted more details - just not had much time to work on and refine a specification as yet. Hopefully more at the DCC.

A short(?) description for those that cannot wait :-)

As things stand at the moment, it is FDM (not OFDM);four RC-shaped DQPSK

waveforms in parallel each at a 75 baud symbol rate - 600 Hz at -60 dB. Modulation is DQPSK that varies from BPSK to 16-DQPSK, selectable to match conditions. The full bandwidth is always used, even at low data rates, however, both time and frequency diversity is then employed. The idea is to use a common DQPSK demodulator that doesn't know the difference - it just demodulates the input waveform as if it were m-DQPSK. That is the job for the packet dissassembler that knows how to unpack the data from information provided in a data header. For that purpose, each packet contains a header that provides a) frequency tracking information, b) bit phasing/clock information (extracted from the sync vector), and c) packet formatting/status information (an ECC protected field). Actual data contents are convolutionally coded using a variable rate code on the inner level, with an outer level block code.

Three modes of operation is planned:

Mode A: Unconnected broadcast mode with full ECC.

Mode B: Hybrid ARQ.

Mode C: Networked (CSMA) with encapsulated TCP/IP.

Mode D: Read-along mode. It is possible for a third party to decode and read traffic, pretty much as we can do with packet at the moment.

All specifications will be published for the benefit of those that wish to implement the protocol. It will be an "open architecture" although I hope to encourage commercialization - consulting and user-support services can be arranged. One essential item that would be made available is a "golden" CD-ROM - this will contain the printed standard, also test and diagnostic signals that will help one to verify whether your implementation conforms to the standard or not.

Hope this helps in the interim,

--Johan, KC7WW

From 100577.1452@CompuServe.COM Wed Aug 14 08:26:19 1996

Received: from hil-img-5.compuserve.com (hil-img-5.compuserve.com [149.174.177.135]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id IAA13481 for <HFSIG@tapr.org>; Wed, 14 Aug 1996 08:26:17 -0500 (CDT)

Received: by hil-img-5.compuserve.com (8.6.10/5.950515) id JAA29813; Wed, 14 Aug 1996 09:25:46 -0400

Date: 14 Aug 96 09:23:49 EDT

From: Mike Kerry <100577.1452@CompuServe.COM>

To: "(unknown)" <HFSIG@tapr.org>

Subject: Sound Cards

Message-ID: <960814132349_100577.1452_GHW94-1@CompuServe.COM>

Can anyone please recommend a good PC sound card which also can be programmed for DSP applications?

(I think this means having the 21xx chip).

Thanks

Mike G4BMK

From forrerj@peak.org Wed Aug 14 10:46:56 1996
Received: from PEAK.ORG (forrerj@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id KAA18353 for <hfsig@tapr.org>; Wed, 14 Aug 1996
10:46:51 -0500 (CDT)
Received: (from forrerj@localhost) by PEAK.ORG (8.6.13/8.6.7) id IAA01679; Wed, 14
Aug 1996 08:47:00 -0700
Date: Wed, 14 Aug 1996 08:47:00 -0700 (PDT)
From: Johan Forre <forrerj@peak.org>
X-Sender: forrerj@kira
To: hfsig@tapr.org
cc: hfsig@tapr.org
Subject: Re: [HFSIG:1499] Sound Cards
In-Reply-To: <960814132349_100577.1452_GHW94-1@CompuServe.COM>
Message-ID: <Pine.SUN.3.91.960814084143.29776C-100000@kira>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Hi Mike,

There used to be a number of manufacturers that used an Analog Devices
three-chip set (included the 2115 DSP) on their sound cards. Now they are
very scarce. Look at the Echo Speech DSP I on their web site:
www.echospeech.com I also have just gotten a catalog from Jameco and see
the sell the Orchid Soundwave 32 for 129 bucks. That is a 20 Mhz version
DSP and I have one that I'm very happy with.

The other alternative is to look for a Turtle Beach Tahiti card - that
one though has a 56002. There is a software toolkit available for that
one as well. It's a really nice PC plugin card.

Hope this helps.

--Johan

On Wed, 14 Aug 1996, Mike Kerry wrote:

> Can anyone please recommend a good PC sound card
> which also can be programmed for DSP applications?
>
> (I think this means having the 21xx chip).
>
> Thanks
>
> Mike G4BMK
>
>

From karn@qualcomm.com Wed Aug 14 13:03:04 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org

(8.7.5/8.7.3/1.9) with ESMTP id NAA24187 for <hfsig@tapr.org>; Wed, 14 Aug 1996 13:03:01 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id LAA13843; Wed, 14 Aug 1996 11:02:28 -0700 (PDT)

Date: Wed, 14 Aug 1996 11:02:28 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608141802.LAA13843@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <199608091633.JAA20720@PEAK.ORG> (forrerj@peak.org)

Subject: Re: [HFSIG:1491] ECC for SHORT data block

>I wonder what a suitable ECC code would be for a short bit field such as
>32-bits.

Is that 32 data bits plus however much overhead is necessary?

Why use such a small block? Performance is always better for larger blocks.

The more I think about the problems of a fading channel, the more I am troubled by schemes that separately encode sync, header and data. There's something to be said for a scheme that encodes and interleaves a continuous bit stream and then layers a simple packet framing scheme on top that doesn't have to deal with frequent errors (e.g., HDLC). Then the packet header would enjoy as much protection as a much larger data field.

One way is a convolutional interleaver followed by a convolutional encoder. A Reed-Solomon code could be layered on top of this to further steepen the waterfall curve if a sync word is inserted to mark the beginning of each RS block. Viterbi decoder and deinterleaver sync can be achieved by a brute-force search of the possible states looking for a good decoder metric to pop out. This is practical because there aren't that many states to search. This is similar to the framing approach used in digital video broadcasting.

The only drawback I can see is the getting-started overhead on short transmissions. But if you need a certain amount of time diversity on a fading channel to span the required number of channel coherence times, you don't really have a choice -- a short transmission could get swallowed by a fade. I.e., there's a minimum transmission time requirement.

Phil

From Robert.Glassey@nmp.nokia.com Wed Aug 14 13:39:02 1996

Received: from noknic.nokia.com (noknic.nokia.com [131.228.6.10]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id NAA25549 for <hfsig@tapr.org>; Wed, 14 Aug 1996 13:38:58 -0500 (CDT)

From: Robert.Glassey@nmp.nokia.com

Received: from samail01.nmp.nokia.com (samail01.nmp.nokia.com [131.228.240.6]) by noknic.nokia.com (8.6.9/8.6.9) with ESMTP id VAA03097 for <hfsig@tapr.org>; Wed, 14 Aug 1996 21:38:25 +0300

Received: from by samail01.nmp.nokia.com with SMTP
(1.37.109.16/16.2) id AA292647671; Wed, 14 Aug 1996 21:34:31 +0300
X-Openmail-Hops: 2
Date: Wed, 14 Aug 96 19:35:28 +0100
Message-Id: <H000029202338282@MHS>
In-Reply-To: <199608081931.MAA14708@servo.qualcomm.com>
Subject: [HFSIG:1486] Re: Amateur culture
Sender: Robert.Glassey@nmp.nokia.com
To: hfsig@tapr.org

>>I would hope the FCC is doing this with a wider view of amateur radio,
>>or does it intend to promote the amateur bands as a test bed for
>>commercial experimentation, rather than for more personal radio
>>experiments? Is this how it is justifying an 'amateur' allocation in a
>>commercial enviroment?

>

> Amateur radio has never existed in a vacuum. Although direct
> commercial exploitation is not allowed, it has always been one of the
> goals of the amateur service to develop technology and to train
> engineers and radio operators who can then benefit commercial and
> government activities. It's a win-win situation. Not only does that
> create new technology for our use, but it earns lots of brownie points
> for ham radio.

It's wider than that but yes, thats part of it.

> Developing new technology on the ham bands that may then be
> commercialized is in itself perfectly legitimate

Mostly, but it can get a little blurred when the amateurs concerned
already have a commercial application and simply use amateur radio as a
vehicle to do commercial research. It's better when amateur research
finds an application in the commercial world, where the amateurs
concerned have no direct commercial interest, but it's very fuzzy.

> I believe "commercial exploitation" should be narrowly defined as
> selling a public communication service for profit.

The international radio regulations defines the amateur service in
article S1.56 as:

"A radiocommunication service for the purpose of self training,
intercommunication and technical investigations carried out by amateurs,
that is, by duly authorised persons interested in radio technique soley
with a personal aim and without pecuniary interest."

This definition is not on the adgenda of any upcomming WRC.

Nowhere in the regulations does it mention advancement of the state of
the art. The only place it mentions the state of the art is when it
requires that 'emitted frequency shall be as stable and free from
spurious emmissions as the state of technical development for such
stations permits'. Advanceing the art appears to be an addition of the

FCC, which of course has no jurisdiction outside the USA.

Still, advancing the art is one motive for interest in radio technique (and the purpose of HFSIG) and should be encouraged, although never to the detriment of other equally valid reasons for interest in radio technique. Of course it is usually entirely in the interests of amateurs in general, but the choice must be theirs, it should never be forced upon them especially in the name of some claimed benefit to a few.

Strictly speaking even the likes of CLOVER and PACTOR should have been developed with commercial experimental licences, then the final tested products sold to amateurs. But this is just as tricky, the line is definitely blurred. It's made for difficult when PACTOR II for example is sold to non-amateurs for high prices as a proprietary commercial protocol.

The difficulty of course, is the risk of losing the amateur element of amateur radio to commercial interests, and thereby either effectively or actually losing amateur bands, or even the entire service, as it may be seen as simply a commercial service and sold accordingly, with many eager buyers, and an equally eager seller.

Cheers,

Rob

From karn@qualcomm.com Wed Aug 14 17:06:38 1996
Received: from warlock.qualcomm.com (warlock.qualcomm.com [129.46.52.129]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id RAA04959 for <hfsig@tapr.org>; Wed, 14 Aug 1996 17:06:35 -0500 (CDT)
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by warlock.qualcomm.com (8.7.5/1.2d/8.7.2/1.12) with ESMTP id PAA14356 for <hfsig@tapr.org>; Wed, 14 Aug 1996 15:05:28 -0700 (PDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id PAA17918; Wed, 14 Aug 1996 15:05:55 -0700 (PDT)
Date: Wed, 14 Aug 1996 15:05:55 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608142205.PAA17918@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <199608141802.LAA13843@servo.qualcomm.com> (karn)
Subject: Re: [HFSIG:1501] Re: ECC for SHORT data block

While waiting for a doctor's appt, I sketched out an approach to an extremely fade-resistant coding scheme along the lines I discussed earlier today.

The channel modulation can be any noncoherent scheme, such as DBPSK or M-ary FSK. The channel symbol stream is fed from a convolutional interleaver. Feeding the convolutional interleaver is a convolutional encoder of some rate, $1/N$.

The interleaving degree is one more than some integer multiple of N , chosen to be large enough to give an adequate interleaving span for the symbol rate and channel coherence time. The extra input to the

interleaver multiplexer is fed with a PN generator used for acquisition and synchronization.

The PN generator period corresponds to one "block length", and the PN epoch is aligned so that it marks the beginning of the block. The PN generator runs continuously throughout a transmission.

The FEC "block" could correspond to a fixed-size block of a sequentially decoded convolutional code, or it could correspond to a Reed-Solomon block that's layered on top of a Viterbi-decoded convolutional code operating in stream mode, possibly with an extra layer of interleaving between the RS and Viterbi coders to spread out the error bursts from the Viterbi decoder. (This is a standard feature of such concatenated codes.)

To acquire this signal, you DBPSK (or M-ary FSK) demodulate the incoming symbol stream at all possible symbol timing phases and then run a PN correlator with sampling taps spaced according to the periodic appearance of the known PN sync sequence in the modulated stream. When the correlator reports a sufficiently high peak, you now have modem symbol timing, Viterbi decoder phase and Reed-Solomon block phase. Or in the case of sequential decoding, you know where to begin sequential decoding.

Alternatively, the "sync channel" input to the interleaver could be all 1's, and the multiplexed output could be PN scrambled. The advantage of this approach is that it is obviously quite easily extended to PN scrambling at a faster rate, i.e., direct sequence spread spectrum.

The result of all this effort is a series of decoded fixed-size data blocks. Each block is almost certain to be either perfect or erased, i.e., there should be few if any undetected errors at this level. Now you can layer a conventional framing scheme, e.g., bit-synchronous or octet-framed HDLC and carry a series of variable length packets.

This scheme seems to provide the maximum robustness possible against fading. Because packets are all framed at a higher layer, no part of the channel stream is more vulnerable than any other.

The biggest drawback is the fairly high overhead required to fill the interleaver buffers at the start of transmission and to flush them at the end, especially if a high degree of interleaving is required (as it would be when the symbol rate is relatively high and the channel coherence time is relatively long). But some overhead is inevitable if you really want protection against fading. (Consider a standalone packet small enough to get lost in a relatively slow fade.) Some tradeoffs are probably required here, as at some point you have to fall back on retransmission (as when fading is very slow).

Phil

From forrerj@peak.org Thu Aug 15 00:01:14 1996

Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id AAA21656 for <hfsig@tapr.org>; Thu, 15 Aug 1996
00:00:55 -0500 (CDT)
Received: from p04.t0.monrotel.com (p09.t0.monrotel.com [198.68.25.42]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id WAA00823 for <hfsig@tapr.org>; Wed, 14 Aug
1996 22:01:01 -0700
Message-Id: <199608150501.WAA00823@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 14 Aug 1996 21:50:48 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1501] Re: ECC for SHORT data block

Phil,

Thanks for the feedback. You make some good points here and your follow-up
is even more interesting and noteworthy. I'll comment on that shortly.

>>I wonder what a suitable ECC code would be for a short bit field such as
>>32-bits.

>

>Is that 32 data bits plus however much overhead is necessary?

Right, 32 bits data + x coding bits; whatever it takes.

>

>Why use such a small block? Performance is always better for larger
>blocks.

Granted; The header is as important as correct synchronization. Without
that, the message cannot be run through the Fano decoder as one wouldn't
know how the bit stream is to be composed. Typically, the block will be a
very compact field.

>

>The more I think about the problems of a fading channel, the more I am
>troubled by schemes that separately encode sync, header and
>data. There's something to be said for a scheme that encodes and
>interleaves a continuous bit stream and then layers a simple packet
>framing scheme on top that doesn't have to deal with frequent errors
>(e.g., HDLC). Then the packet header would enjoy as much protection
>as a much larger data field.

This is a concern; With flat fading, or certain kinds of selective fading,
this certainly may be valid. The sync vector/header, as presented, does not
really exploit time diversity to address fading. Except (and that is part of
the question I posed), if the right kind of code is used, i.e., one that

effectively deals with burst errors, like for example RS.

The proposed scheme does however, offer some strenghts to this problem. It does exploit a certain degree of frequency diversity in addition to robust modulation waveform for this portion; each of the four channels carries the same information (replicated x 4) in four BPSK identical channels. These two factors, together, offers some advantages that are put to good use to combat the HF channel. If I may illustrate the expected gain in error performance that this robust header may offer:

For a BER of 10^{-5} in a 3 kHz BW channel:

1200 bps with 2 fading channels, 2ms multipath, and 1 Hz fading BW req. 11 dB S/N

75 bps with 2 fading channels, 5ms multipath, and 5 Hz fading BW req. 2 dB S/N

^^^^

(from MIL-STD-188 documents - some liberties taken)

We are looking at the 75 bps performance figure for the sync vector and header portion. Think we can agree that this illustrates a fairly realistic, though poor HF channel, and that the encoding scheme/waveform is not doing too bad, i.e. 2dB S/N for a BER of 10^{-5} .

--Johan

From karn@qualcomm.com Thu Aug 15 05:16:01 1996

Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.128.14]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id FAA05508 for <hfsig@tapr.org>; Thu, 15 Aug 1996 05:15:55 -0500 (CDT)

Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id DAA19279; Thu, 15 Aug 1996 03:15:23 -0700 (PDT)

Date: Thu, 15 Aug 1996 03:15:23 -0700 (PDT)

From: Phil Karn <karn@qualcomm.com>

Message-Id: <199608151015.DAA19279@servo.qualcomm.com>

To: hfsig@tapr.org

In-reply-to: <199608150501.WAA00823@PEAK.ORG> (forrerj@peak.org)

Subject: Re: [HFSIG:1504] Re: ECC for SHORT data block

Some further reflections on the scheme I sketched out earlier today. My original reason for using a convolutional interleaver was to make it practical to try all possible interleaver phases in the acquisition phase.

But that's not necessary if I mux in a continuous PN sync sequence. Just make the PN period equal to the length of a block, and phase it accordingly. Then when you find the peak from the PN correlator at the receiver, you know exactly where all the symbols are in the block and where the block begins and ends.

This gets rid of all overhead from filling and flushing the interleaver pipeline, since a block interleaver produces exactly as many symbols as it gets. But it does mean using a fixed size block,

and there may be some internal fragmentation (fancy term for "unused space") on small packets. But again, this may be inevitable if you're trying for enough time diversity to overcome fading.

Phil

From wd5ivd@tapr.org Fri Aug 16 12:22:32 1996
Received: (from wd5ivd@localhost) by tapr.org (8.7.5/8.7.3/1.9) id MAA09958; Fri, 16 Aug 1996 12:22:27 -0500 (CDT)
From: Greg Jones <wd5ivd@tapr.org>
Message-Id: <199608161722.MAA09958@tapr.org>
Subject: TAPR offers Motorola EVM56002 group purchase
To: tapr-bb@tapr.org (TAPR-BB mailing),
amsat-bb@amsat.org (AMSAT BB Mail Group),
hfsig@tapr.org (HF SIG mailing), dsp-93@tapr.org (DSP-93 Build)
Date: Fri, 16 Aug 1996 12:22:26 -0500 (CDT)
X-Mailer: ELM [version 2.4 PL25]
Content-Type: text

TAPR offers Motorola EVM56002 group purchase 8/15/96

TAPR and Motorola have agreed on a special group purchase of the Motorola DSP56002 Evaluation Modules (EVM) for a limited time. The DSP56002 EVM is a general purpose DSP board with on board peripherals and software for assembling and debugging code. TAPR would like to thank Tim Baggett, AA5DF, of Motorola for facilitating this purchase.

The price will be:
\$85.00 US (+ s/h) **

The EVM56002 normally retails through distributors for \$150.

** No 10% Discount for TAPR Members.
Due to the nature of the purchase, TAPR cannot offer a membership discount.

For more information on the DSP56002EVM purchase, please see the TAPR web page at <http://www.tapr.org>

For more information on the DSP56002 EVM and Motorola DSP products visit the Motorola DSP web page at <http://www.motorola-dsp.com>.

Please note: This unit provides a minimum interface for radio connections. Additional circuits are required for specific radio interfaces based on the application. See the TAPR HF SIG Upload Area ([ftp.tapr.org /tapr/SIG/hfsig/upload](ftp://ftp.tapr.org/tapr/SIG/hfsig/upload)) for files on one type of radio interface. There are other units that provide complete radio interfaces and should be considered if you feel that you are not capable of building such items.

This EVM group purchase will include:

- * EVM56002 Board
See below for specs.
- * Motorola's DSP56000 cross assembler
- * Domain Technologies' debug GUI debug software (DOS, >386 CPU)
both communicates with the EVM over an RS232 serial port
- * Available amateur software developed for the 56002 EVM board
- * Documentation
56000 Family Manual,
56002 User's Manual,
56002 Data Sheet,
Quickstart Guide,
Debugger manual, and
Schematics

TAPR will be taking orders for up to 200 units.

Orders will be taken through the ARRL/TAPR Digital Communications Conference in Seattle on September 21-22, 1996.

Shipping will not begin until the units are delivered from Motorola, which will be sometime after September 22nd. Money will be deposited when the order is placed with Motorola.

If you would like to order one of these units, you can
e-mail tapr@tapr.org,
phone (817) 383-0000, or
fax (817) 566-2544.

Office Hours: Tuesday - Friday 9am - 12pm, 3pm - 5pm Central Time

Questions concerning the unit and details on the buy will be handled on the TAPR DSP-93 Special Interest Group list. To subscribe, send e-mail to listserv@tapr.org. In the message type subscribe dsp93 YourFirstName YourLastName. The server will then send you a message back. Announcements on the status of the shipment will be made to the TAPR DSP-93 list and TAPR-BB lists.

Shipping and Handling

- * Shipping and Handling within the US will be \$10.00 US
by UPS Ground unless otherwise requested by purchaser.
- * International Shipping will need to contact the TAPR office and get a

quote on the shipping to your country. TAPR uses International Express Mail, unless the purchaser requires something else.

General Information

The DSP56002EVM is based on the 56002 general purpose DSP by Motorola. The 56002 is a 24-bit precision, dual memory space harvard architecture digital signal processor. The board contains a stereo CD-quality audio codec, on-board 32k words external SRAM, and an expansion spot for a 32K flash EEPROM. The user only needs to supply the IBM PC compatible computer, a 7-9 volt AC or DC power supply, and an RS232 cable for interfacing to the PC.

The DSP56002 EVM is perfect for the hobbyist and student wishing to learn DSP programming on the Motorola 56002 DSP. Many amateur radio applications have been written and used on the DSP56002 EVM including, 1200 AFSK packet, 9600 FSK packet, RTTY, BPSK, QPSK, and various audio filters for CW, SSB, and QRM/QRN reduction.

The 24-bit DSP56002 feature:

- 40 MHz operation (new EVM's are 6 MHZ, and most have operated at much higher clock rates)
- 20 MIPS at 40 MHz (50 nS instruction cycle at 40 MHz)
- 120 Million Operations per second (MOPS) at 40 MHz
- 512x24 bit on-chip program RAM with bootstrap ROM
- two 256x24 bit on-chip data RAMs (X and Y data spaces)
- External memory expansion with 16 bit address and 24 bit data bus
- Byte wide host interface

- Synchronous Serial Interface (SSI)
- Serial Communications Interface (SCI)
- 24-bit timer/event counter
- software programmable internal clock PLL

The EVM features:

- 32kx24 bit zero wait-state external SRAM
- option for 32Kx8 flash EEPROM for program bootstrapping and stand-alone operation
- Crystal Semiconductor's CS4215 stereo CD quality sigma-delta A/D D/A
- on-board voltage regulator
- RS232 interface to the OnCE (tm) controller
- RS232 interface to the DSP SCI port for communication between the DSP56002 and a terminal (PC) directly
- connectors for external access to the DSP56002's memory expansion, host interface, and serial interfaces (SSI, SCI)
- documentation (56000 Family Manual, 56002 User's Manual, 56002 data sheet, quickstart guide, debugger manual, schematics)

The on-board Crystal A/D D/A features:

24.576 MHz crystal for sampling at 48, 32, 16, 9.6, and 8 Ksps
16 bit linear, 8-bit mu-law, 8-bit a-law, and 8-bit linear sampling

the 24.576 MHz crystal can be replaced to provide other sample rates
Software programmable signal attenuation

P.S. TAPR is also doing a group purchase on PC-DSP and PC-SIM for Windows.
This is an excellent package for learning and developing DSP software.
See: <http://www.tapr.org>

The PC-DSP is an interactive, menu-driven software package used for:
waveform synthesis using a variety of methods, basic signal operation, fast
Fourier transforms, convolution and correlation, solution of difference
equations, analysis and design of IIR and FIR filters, digital filter
simulation and code generation, and power spectrum estimation using
classical and modern techniques. Some key features of PC-DSP listed
include: GNUPLLOT support, code generation, macro compiler, dialog compiler,
sound file support, data file formats, and compatibility with PC-SIM.

Tucson Amateur Packet Radio
8987-309 E Tanque Verde Rd #337 * Tucson, Az * 85749-9399 * 817-383-0000

e-mail: TAPR@TAPR.ORG ftp: [ftp.tapr.org](ftp://ftp.tapr.org) web: <http://www.tapr.org/tapr>

From BRYD@KIDD.CO.ZA Tue Aug 20 02:20:42 1996
Received: from igw01 (igw01.kidd.co.za [192.96.246.1]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id CAA28269 for <hfsig@tapr.org>; Tue, 20 Aug 1996
02:20:08 -0500 (CDT)
Received: from KIDD.CO.ZA by igw01 with smtp
(Smail3.1.29.1 #3) id m0usjYX-000P4hC; Tue, 20 Aug 96 07:40 GMT+0200
Received: from KenMail-Message_Server by KIDD.CO.ZA
with Novell_GroupWise; Tue, 20 Aug 1996 07:41:31 +0200
Message-Id: <s2196c2b.055@KIDD.CO.ZA>
X-Mailer: Novell GroupWise 4.1
Date: Tue, 20 Aug 1996 07:42:39 +0200
From: Danie Brynard <BRYD@KIDD.CO.ZA>
To: hfsig@tapr.org
Subject: [HFSIG:1500] Re: Sound Cards -Reply

Johan commented:

The other alternative is to look for a Turtle Beach Tahiti card - that one
though has a 56002. There is a software toolkit available for that one as
well. It's a really nice PC plugin card.

Hope this helps.

--Johan

How much is this card more or less Johan ? Does it have a debugger ?
danie

From forrerj@peak.org Tue Aug 20 10:56:50 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id KAA15625 for <hfsig@tapr.org>; Tue, 20 Aug 1996
10:56:47 -0500 (CDT)
Received: from p01.t0.monrotel.com (p02.t0.monrotel.com [198.68.25.35]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id IAA16578 for <hfsig@tapr.org>; Tue, 20 Aug
1996 08:56:58 -0700
Message-Id: <199608201556.IAA16578@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 20 Aug 1996 08:47:32 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1507] Re: Sound Cards -Reply

Danie,

>Johan commented:
>The other alternative is to look for a Turtle Beach Tahiti card - that one
>though has a 56002. There is a software toolkit available for that one as
>well. It's a really nice PC plugin card.
>
>Hope this helps.
>
>--Johan
>
>How much is this card more or less Johan ? Does it have a debugger ?
>danie
>
>

Don't know the price, but to be competitive, it would be in the \$250 range.
And yes; there is a 3-rd party software toolkit (not from Turtle Beach) with
a debugger that apparently has the usual breakpoint/single step debugging.

While on the subject: if anyone would like to tackle the DSP chip on the
Creative Labs. "Soundblaster" boards, i.e., the chip they call the "ASP", I
have found the manual for it on the Web. Unfortunately it is a rather
limited DSP - better to be left alone (my opinion). Anyway, CL have lately
been using 56002's in their video conferencing products.

There also is a TI320C32-based sound card that may interest you; see
www.core-dynamics.com for further details. Not sure what the deal is
regarding your own software development for it.

A bit of feedback on the TI320C31 floating point DSP that may interest you: That turned out to be a somewhat of a disappointment for me; the multiplier takes two 32-bit integers and the result is a 40-bit number. Compare this with the 56002 EVM that takes two 24-bit (or 48-bit doubles) but gives you 56-bit accumulator arithmetic results. Or the ADSP 21xx family that takes two 16-bit data words and results are 40-bit numbers. It is possible of course to achieve extended precision through multiple instructions, albeit at a performance hit. Unless one really needs 32-bit floating point multiplies, I think you will agree that the 56002 EVM is an exceptional bit of hardware.

Sorry - nothing to do with HF digital, but hope some useful information for experimentors.

--Johan

From karn@qualcomm.com Tue Aug 20 21:37:42 1996
Received: from servo.qualcomm.com (servo.qualcomm.com [129.46.101.170]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id VAA14835 for <hfsig@tapr.org>; Tue, 20 Aug 1996 21:37:38 -0500 (CDT)
Received: (from karn@localhost) by servo.qualcomm.com (8.7.5/1.0/8.7.2/1.9) id TAA17725; Tue, 20 Aug 1996 19:37:04 -0700 (PDT)
Date: Tue, 20 Aug 1996 19:37:04 -0700 (PDT)
From: Phil Karn <karn@qualcomm.com>
Message-Id: <199608210237.TAA17725@servo.qualcomm.com>
To: hfsig@tapr.org
In-reply-to: <199608130327.UAA28713@PEAK.ORG> (forrerj@peak.org)
Subject: Re: [HFSIG:1495] FTP Packet Driver Specification

Johan,

For the FTP Packet Driver spec, see

http://www.crynwr.com/crynwr/packet_driver.html

Note that all this really does is to provide a portable interface to an Ethernet card. Although the spec is supposedly general enough to support other kinds of interfaces, I don't know that it has ever been used for this purpose.

The software that calls a packet driver must still know quite a bit about the Ethernet link layer, such as addresses, type fields, and the like. So unless you are prepared to make you modem look just like an Ethernet board (which is a questionable thing to do for an HF radio modem) you don't really want to use this interface. What you really want is a full-blown IP router that can encapsulate and decapsulate IP in various link layer protocols such as AX25, Ethernet and whatever link protocol you create for your modem. That would be much more useful, I think.

Phil

From rickc@tridelta.com Wed Aug 21 08:11:03 1996

Received: from wariat.apk.net (uucp@wariat.wariat.org [192.147.147.1]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id IAA08136 for <hfsig@tapr.org>; Wed, 21 Aug 1996 08:11:01 -0500 (CDT)

Received: (from uucp@localhost) by wariat.apk.net (8.7.5/8.7.3) id JAA08415 for hfsig@tapr.org; Wed, 21 Aug 1996 09:11:21 -0400 (EDT)

>Received: from sparcy.tridelta.com (sparcy [192.160.168.222]) by tdi3.tridelta.com (8.6.9/8.6.9) with ESMTP id JAA26720 for <hfsig@tapr.org>; Wed, 21 Aug 1996 09:01:02 -0400

Received: from sparcy.tridelta.com (sparcy [192.160.168.222]) by tdi3.tridelta.com (8.6.9/8.6.9) with ESMTP id JAA26720 for <hfsig@tapr.org>; Wed, 21 Aug 1996 09:01:02 -0400

Received: from rickcpc.tridelta.com (rickcpc.tridelta.com [192.160.168.30]) by sparcy.tridelta.com (8.7.1/8.7.1) with SMTP id JAA01480; Wed, 21 Aug 1996 09:01:18 -0400 (EDT)

Date: Wed, 21 Aug 1996 09:01:18 -0400 (EDT)

Message-Id: <199608211301.JAA01480@sparcy.tridelta.com>

X-Sender: rickc@pophost.tridelta.com

X-Mailer: Windows Eudora Version 1.4.4

Mime-Version: 1.0

To: hfsig@tapr.org, hfsig@tapr.org

From: rickc@tridelta.com (Rick Contaldo)

Subject: Re: [HFSIG:1508] Re: Sound Cards -Reply

Content-Type: text/plain; charset="us-ascii"

At 11:01 AM 8/20/96 -0500, Johan Forrer. wrote:

>While on the subject: if anyone would like to tackle the DSP chip on the
>Creative Labs. "Soundblaster" boards, i.e., the chip they call the "ASP", I
>have found the manual for it on the Web. Unfortunately it is a rather
>limited DSP - better to be left alone (my opinion). Anyway, CL have lately
>been using 56002's in their video conferencing products.

>

>

>--Johan

>

>

Johan,

I'm curios about the Creative Labs ASP. Would you please point me to the site where you found the manual?

Thanks,

Rick

From k4jppj@appstate.campus.mci.net Wed Aug 21 13:13:24 1996

Received: from appstate-01.campus.mci.net (appstate-01.campus.mci.net [204.71.75.162]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id NAA20155 for <hfsig@tapr.org>; Wed, 21 Aug 1996 13:13:21 -0500 (CDT)

Received: from s07-pm02.appstate.campus.mci.net (s07-pm02.appstate.campus.mci.net [206.24.85.66]) by appstate-01.campus.mci.net (8.7.5/8.7.3) with SMTP id OAA04139

for <hfsig@tapr.org>; Wed, 21 Aug 1996 14:12:39 -0400 (EDT)
Message-Id: <199608211812.0AA04139@appstate-01.campus.mci.net>
X-Sender: k4jppj@appstate.campus.mci.net
X-Mailer: Windows Eudora Light Version 1.5.2
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 21 Aug 1996 14:12:34 -0400
To: hfsig@tapr.org
From: "Donald E. Haselwood" <k4jppj@appstate.campus.mci.net>
Subject: Frame-Check Sequence for AX.25

I'm trying to code sending packet info and for the Frame Check Sequence (FCS) I find the AX.25 specs only say, "It shall be calculated in accordance with ISO 3309 (HDLC) Recommendations." Anyone know where I could find a description for the FCS calculation (or even better Motorola 68HC11 code!).

Don, K4JPJ

From forrerj@peak.org Wed Aug 21 14:28:04 1996
Received: from PEAK.ORG (forrerj@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id OAA23567 for <hfsig@tapr.org>; Wed, 21 Aug 1996 14:28:03 -0500 (CDT)
Received: (from forrerj@localhost) by PEAK.ORG (8.6.13/8.6.7) id MAA24087; Wed, 21 Aug 1996 12:28:01 -0700
Date: Wed, 21 Aug 1996 12:28:00 -0700 (PDT)
From: Johan Forre <forrerj@peak.org>
X-Sender: forrerj@kira
To: Rick Contaldo <rickc@tridelta.com>
cc: hfsig@tapr.org
Subject: Re: [HFSIG:1510] Re: Sound Cards -Reply
In-Reply-To: <199608211301.JAA01480@sparcy.tridelta.com>
Message-ID: <Pine.SUN.3.91.960821122524.23532A-100000@kira>
MIME-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Rick,

On Wed, 21 Aug 1996, Rick Contaldo wrote:

> At 11:01 AM 8/20/96 -0500, Johan Forrer. wrote:
>
> >While on the subject: if anyone would like to tackle the DSP chip on the
> >Creative Labs. "Soundblaster" boards, i.e., the chip they call the "ASP", I
> >have found the manual for it on the Web. Unfortunately it is a rather
> >limited DSP - better to be left alone (my opinion). Anyway, CL have lately
> >been using 56002's in their video conferencing products.
> >
> >
> >--Johan
> >
> >
>
> Johan,

>
> I'm curious about the Creative Labs ASP. Would you please point me to
> the site where you found the manual?

Look for the D-950 core under chips at SGS-Thompson's web site (www.st.com).

>
> Thanks,
>
> Rick
>
>
>

Good luck.

--Johan

From forrerj@peak.org Wed Aug 21 21:47:55 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id VAA13992 for <hfsig@tapr.org>; Wed, 21 Aug 1996
21:47:50 -0500 (CDT)
Received: from p03.t0.monrotel.com (p03.t0.monrotel.com [198.68.25.36]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id TAA04371 for <hfsig@tapr.org>; Wed, 21 Aug
1996 19:48:03 -0700
Message-Id: <199608220248.TAA04371@PEAK.ORG>
X-Sender: forrerj@peak.org
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 21 Aug 1996 19:38:49 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1509] Re: FTP Packet Driver Specification

Phil,

Thanks for the pointer and also thanks to all the others that pointed me in
the right direction.

With Pawel's help, I hacked a version of his AX25 low level driver and then
have NOS call the driver through a software interrupt via standard FTP
packet driver call mechanism. Looked simple enough (Heck, I learned a lot.)

I have been testing and playing with this software interface for monitoring
300 baud HF packet, although I have no intentions to use 300 baud HF packet
- just thought it a good test. NOS is used to monitor AX25 traffic, but I
could have used a number of user interface programs that would accept the
interrupt hook.

It is encouraging to see how well the low-level HDLC code seems to do,
considering the poor conditions and very low signal levels on the bands.
However, I must admit that the DSP modem is probably the main contributing

factor.

Anyway, still a lot more to do and a lot more to learn.

73's

--Johan

From forrerj@peak.org Thu Aug 22 12:55:43 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id MAA20147 for <HFSIG@TAPR.ORG>; Thu, 22 Aug 1996
12:55:42 -0500 (CDT)
Received: from p06.t0.monrotel.com (p05.t0.monrotel.com [198.68.25.38]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id KAA20435 for <HFSIG@TAPR.ORG>; Thu, 22 Aug
1996 10:55:54 -0700
Message-Id: <199608221755.KAA20435@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Fri, 22 Aug 1997 10:46:48 -0800
To: HFSIG@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: PSK Sound files

Hi folks,

I uploaded some .WAV sound files from my experimental DQPSK
modems. These will give you an idea what the waveforms sound
and look like. Included are single and multi-channel m-DPSK
samples. The package is available for downloading from:

ftp://ftp.tapr.org/SIG/hfsig/upload/psk_snd1.txt and [psk_snd1.zip](ftp://ftp.tapr.org/SIG/hfsig/upload/psk_snd1.zip)

Wish I had more time to work on this project, but things have
been busy as usual.

73's

--Johan

From forrerj@peak.org Fri Aug 23 01:58:33 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id BAA25804 for <hfsig@tapr.org>; Fri, 23 Aug 1996
01:58:30 -0500 (CDT)
Received: from p00.t0.monrotel.com (p00.t0.monrotel.com [198.68.25.33]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id XAA05524 for <hfsig@tapr.org>; Thu, 22 Aug
1996 23:58:41 -0700
Message-Id: <199608230658.XAA05524@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0

Content-Type: text/plain; charset="us-ascii"
Date: Fri, 22 Aug 1997 23:49:43 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: PSK Sound files

Hi,

If you are having problems locating the PSK sound files, either try:

<http://www.tapr.org> using a web browser - follow the links to hfsig/upload, or;

FTP directly to: [ftp.tapr.org/tapr/SIG/hfsig/psk_snd1.txt](ftp://ftp.tapr.org/tapr/SIG/hfsig/psk_snd1.txt) + .zip

That should do it. Sorry about that.

--Johan

From vk7zo@calvados.apana.org.au Fri Aug 23 15:50:00 1996
Received: from core.apana.org.au (core.apana.org.au [203.12.236.10]) by tapr.org (8.7.5/8.7.3/1.9) with ESMTP id PAA24622 for <hfsig@tapr.org>; Fri, 23 Aug 1996 15:49:57 -0500 (CDT)
Received: from calvados.UUCP (uucp@localhost) by core.apana.org.au (8.7.5/8.7.3) with UUCP id FAA25685 for hfsig@tapr.org; Sat, 24 Aug 1996 05:56:31 +1000
Received: by calvados.apana.org.au (1.65/waf)
via UUCP; Fri, 23 Aug 96 09:14:38 +1000
for hfsig@tapr.org
To: hfsig@tapr.org
Subject: New member
From: vk7zo@calvados.apana.org.au (Graham Ranft)
Message-ID: <Za39uD2w165w@calvados.apana.org.au>
Date: Fri, 23 Aug 96 09:07:22 +1000
Organization: APANA, Hobart, Tasmania: 03 6234 8530

Hi just a short one to say hello and introduce myself on HFSIG.
Recently aquired a paccom ptc level 1 and this has started me looking again at digital sig precessing and digging into coding etc as well as things ionosphorical... I am currently only operation on 3632 owing to noise problems on 20 mx from ptc which is going to require a complete station rework-earthing etc etc probably plus ferrite beading and other shutting up measures. Since I am going to be moving qth before to much longer this can wait till then. I have been active on pacsats and 9600 bd sats this is a new and welcome (and interesting) change in direction. If anybody has any mods to improve paccom ptc 1's I would be grateful for any info.

I have interent WWW access and have accessed Phil Suusmans page (and subscribed) as well as SCS .

Hope to meet some of you via this or on HF 'ere long-be hapy and well Graham at Dromedary near Hobart Tasmania , Australia.

email vk7zo@ calvados.apana.org.au
packet vk7zo@vk7gl.#hbt.tas.oc.au

73's

--

vk7zo@calvados.apana.org.au (Graham Ranft)
APANA, Hobart, Tasmania: 03 6234 8530

From wd5ivd@tapr.org Sun Aug 25 10:28:03 1996
Received: (from wd5ivd@localhost) by tapr.org (8.7.5/8.7.3/1.9) id KAA02689 for hfsig@tapr.org; Sun, 25 Aug 1996 10:28:02 -0500 (CDT)
From: Greg Jones <wd5ivd@tapr.org>
Message-Id: <199608251528.KAA02689@tapr.org>
Subject: Re: [HFSIG:1457] Re: EVM56002 ?
To: hfsig@tapr.org
Date: Sun, 25 Aug 1996 10:28:02 -0500 (CDT)
In-Reply-To: <320730BC.1500@pig.net> from "Mike Murphree" at Aug 6, 96 06:49:24 am
X-Mailer: ELM [version 2.4 PL25]
Content-Type: text

Yes -- this is a great offer. Dorothy has about 40 on order right now.

Please pass the word to students and school, since they can get in on the offer as well.

I am hoping this is one of many future involvements with Motorola in the future.

Cheers - Greg, WD5IVD

>
> Greg Jones wrote:
>
> > There is an opportunity for TAPR to do a group purchase on the Motorola
> > EVM56002 at a pretty low cost. Between 20 and 200 units would be the
> > goal...same price no matter how many are purchased. Figure about \$60 under
> > current commercial prices. No hard prices, because more work would have to
> > be done.
> >
> > Would there be interest in this in the HF SIG ? Especially since Johan's
> > code would run on it.
>
> Sounds great considering the price is already only \$149.95 at the
> Design-Net price page (<http://www2.motorola-dsp.com/dsp/home/net/pg.html>).
>
> They also offer a student discount of 20% reducing the price to \$120 + \$3
> shipping (<http://www2.motorola-dsp.com/dsp/home/edu/discount.html>)
>
> Mike N4CNW
>
>

From forrerj@peak.org Sun Aug 25 23:39:52 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id XAA17458 for <hfsig@tapr.org>; Sun, 25 Aug 1996 23:39:45 -0500 (CDT)

Received: from p09.t0.monrotel.com (p09.t0.monrotel.com [198.68.25.42]) by
PEAK.ORG (8.6.13/8.6.7) with SMTP id VAA01385 for <hfsig@tapr.org>; Sun, 25 Aug
1996 21:39:39 -0700

Message-Id: <199608260439.VAA01385@PEAK.ORG>

X-Sender: forrerj@peak.org (Unverified)

X-Mailer: Windows Eudora Version 1.4.4

Mime-Version: 1.0

Content-Type: text/plain; charset="us-ascii"

Date: Sun, 25 Aug 1996 21:30:58 -0800

To: hfsig@tapr.org

From: forrerj@peak.org (Johan Forrer.)

Subject: Re: [HFSIG:1517] Re: EVM56002 ?

Hi Greg,

Sounds like things are going with the EVM orders - I'm pleased to hear that.
I don't think anyone will be dissapointed as it is a great DSP to work with;
a lot of PD code and development tools available too. I suspect that by time
of the DCC you may even have further orders.

Looking forward to the DCC. My wife will be coming along this time, and we
will be in Seattle already by Thursday to visit a bit. One of our favorite
cities.

I need to mention one item for the HFSIG agenda that we have to take care of
at the DCC; that is that we need to find someone that would be willing to
fill the function of moderator/scribe/organiser. Perhaps it is a good idea
to get some fresh ideas. I will continue my participation and sharing in my
experimental and development efforts.

--Johan

>Yes -- this is a great offer. Dorothy has about 40 on order right now.
>

>Please pass the word to students and school, since they can get in on the
>offer as well.

>

>I am hoping this is one of many future involvements with Motorola in the
>future.

>

>Cheers - Greg, WD5IVD

From rroyael@laser.net Tue Aug 27 12:26:46 1996

Received: from smtp1.laser.net (root@[199.172.16.10]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id MAA03651 for <hfsig@tapr.org>; Tue, 27 Aug 1996
12:26:44 -0500 (CDT)

Received: from ffx52.LASER.NET (ffx52.LASER.NET [199.172.16.52]) by
smtp1.laser.net (8.6.9/8.6.9) with SMTP id NAA02625 for <hfsig@tapr.org>; Tue, 27
Aug 1996 13:23:36 -0400

Message-Id: <2.2.16.19960827182635.315fb6f4@smtp1.laser.net>

X-Sender: rroyael@smtp1.laser.net

X-Mailer: Windows Eudora Pro Version 2.2 (16)
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 27 Aug 1996 13:26:35 -0500
To: hfsig@tapr.org
From: Rob Roy <rroyael@laser.net>
Subject: Who sells HF path simulators and related equipment?

Hi;

I realize that there are a lot of different HF path simulators that are used for testing. I would like to obtain any and all information on current/future systems. The results of this query will be posted.

--

Rob Roy
rroyael@laser.net

From forrerj@peak.org Tue Aug 27 16:00:20 1996
Received: from PEAK.ORG (root@PEAK.ORG [198.68.22.17]) by tapr.org (8.7.5/8.7.3/1.9) with SMTP id QAA16055 for <hfsig@tapr.org>; Tue, 27 Aug 1996 16:00:18 -0500 (CDT)
Received: from p01.t0.monrotel.com (p09.t0.monrotel.com [198.68.25.42]) by PEAK.ORG (8.6.13/8.6.7) with SMTP id OAA01809 for <hfsig@tapr.org>; Tue, 27 Aug 1996 14:00:32 -0700
Message-Id: <199608272100.OAA01809@PEAK.ORG>
X-Sender: forrerj@peak.org (Unverified)
X-Mailer: Windows Eudora Version 1.4.4
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Tue, 27 Aug 1996 13:52:09 -0800
To: hfsig@tapr.org
From: forrerj@peak.org (Johan Forrer.)
Subject: Re: [HFSIG:1519] Who sells HF path simulators and related equipment?

Rob,

I cannot speak for professional equipment manufacturers - there are several and they are expensive ~ \$30,000 range for a Watterson channel simulator.

However, a blatant plug for the work and interests from this list (HFSIG) - we are proud of it.

HFSIG have been discussing HF channel simulators based on the Watterson ionospheric model for some time (approximately 3 years). This model represents narrow-band ionospheric propagation behavior as it affects HF, typically an SSB bandwidth channel (ca. 3000 Hz) - typically to conform to test conditions as set out by the CCIR. This includes various types/degrees of channel disturbances, such as multipath, flat, and selective fading. Although of much importance, this does not include simulated noise - that is

the subject of further work.

The objective and incentive for this work was to provide a low-cost implementation for amateurs to evaluate modems for HF use. Based on work initiated by Alexander Kurpiers, DL8AAU, and with generous assistance from Juergen Hash, DG1SCR, I made a simplified version of such a simulator. This particular implementation runs on TAPR's DSP-93, which uses a TMS320C25 DSP chip. Executable code is available for downloading (free for amateur use) on the HFSIG files area. Contact TAPR for further details on the DSP-93 hardware. It may be a good idea to get in touch with Alexander should you want to know more about this particular implementation.

You may also want to browse through the work done by Eric Johnson for NTIA regarding ALE (atanasoff.nmsu.edu/pub/hf). I have been told that Eric does related consulting work and offers a low-cost HF channel simulator.

As for the future - I am considering developing a professional version HF channel simulator to compete with the \$30,000 Watterson channel simulator hardware. E-mail me for further information if you are interested.

Hope this is of interest.

--Johan Forrer
(e-mail: forrerj@peak.org)

>Hi;
>
> I realize that there are a lot of different HF path simulators
>that are used for testing. I would like to obtain any and all
>information on current/future systems. The results of this
>query will be posted.
>
>--
>
> Rob Roy
>rroyael@laser.net
>
>
>

From ejohnson@NMSU.Edu Wed Aug 28 10:01:34 1996
Received: from bubba.NMSU.Edu (bubba.NMSU.Edu [128.123.3.39]) by tapr.org
(8.7.5/8.7.3/1.9) with SMTP id KAA07198 for hfsig@tapr.org; Wed, 28 Aug 1996
10:01:32 -0500 (CDT)
Received: from NMSU.Edu by bubba.NMSU.Edu (8.6.10/NMSU)
id JAA18086; Wed, 28 Aug 1996 09:01:26 -0600
From: ejohnson@NMSU.Edu (
Received: from atanasoff by NMSU.Edu (8.6.10/NMSU-1.18)
id JAA18442; Wed, 28 Aug 1996 09:01:10 -0600
Date: Wed, 28 Aug 1996 09:01:10 -0600
Message-Id: <199608281501.JAA18442@NMSU.Edu>
Received: by atanasoff (AIX 3.2/UCB 5.64/NMSU)
id AA21385; Wed, 28 Aug 1996 09:01:10 -0600

To: hfsig@tapr.org
Subject: HF Channel Simulator

Hi,

Tim Baggett (a former student) forwarded your request for info about HF channel simulators. By mid-September I'll be shipping a new low-cost Watterson model simulator based on the Motorola 56002. It simulates two channels simultaneously, each having two independently-fading paths. The user interface is a serial port, through which you can set (for each channel):

- * the SNRs for the two paths
- * the Doppler spread (fading bandwidth)
- * the delay between the two paths.

Since this was originally developed for manufacturers of MIL/FED-STD ALE gear, there is also a set of preset combinations for Gaussian noise, ITU-Good, and ITU-Poor channels at specific SNRs.

The selling price for just the DSP board (unencumbered by case, power supply, etc.) is \$500. A unit mounted in a case with power supply is \$1000.

Contact: Johnson Research
100 Horseshoe Circle
Las Cruces, NM 88005

Regards

Eric Johnson